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REPORT
ON THE
NATURAL HISTORY RESULTS
OF THE
PAMIR BOUNDARY COMMISSION

BY
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WITH A LIST OF THE PLANTS
BY
John
J. F. DUTHIE, Esq., B.A., F.L.S.

AND

A NOTICE OF THE ROCK-SPECIMENS
BY
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REPORT

ON THE

NATURAL HISTORY RESULTS

OF THE

PAMIR BOUNDARY COMMISSION.

SECTION 1.

Introductory and Explanatory.

THE Commission left Bandipur in Kashmir on the 21st June, and returned to Bandipur on the 12th October, and all the species mentioned in this report were collected between those dates.

The entire collection consists of 143 species of animals and 116 species of plants, of which 66 species of animals and 115 of plants came from the Pamirs.

These results may seem small; but it must be borne in mind, first, that, beyond the already well-known limits of Gilgit, the country traversed by the Commission is one that, except for a few isolated spots of cultivation, may be fairly described as barren and inhospitable; secondly, that considerations of decisive political importance forbade any sort of delay along the road; and thirdly, that although no overwhelming difficulties of transport actually occurred, they were anticipated to such a degree as to make rigid retrenchment of collecting material obligatory. In short, and more especially in so far as the collections made along the road are judged, it has to be remembered that the expedition was first and foremost a political one, and that any efforts in behalf of natural history that might have delayed its progress towards the scene of action, or that might have impeded its return before the closing of the passes, were quite out of question.

Since the country on this side of Gilgit was considered to be well known, or, at any rate, to be always open to future observation, and since, as already stated, economy of transport was necessary at the start, it here seemed advisable to increase our collections with judgment, and only at places—such as the higher passes—which are less easily accessible to ordinary collectors. In this part of our journey, therefore, only a few examples of the Alpine flora of the Burzil were preserved, and only such animals as were specially desirable.

Again, between Gilgit and Bozai Gumbaz, botanical collection, in the circumstances, had to be left alone. In our hurried passage it would have been impossible, even with unlimited transport, to make anything like a complete collection; and rather than bring away a few haphazard specimens, it was thought preferable to keep all collecting material intact for the less accessible flora of the Pamirs. But so far as zoology was concerned, everything that could be got along this part of the march was preserved.

On the other hand, when the Pamirs were reached, every effort was made to get together as complete and representative a collection as possible; and cabinet specimens of the rocks, and of most of the animals and of almost every plant seen, were brought away.

The rocks have been described by Mr. T. H. Holland, of the Geological Survey; the plants have been determined by Mr. Duthie, of the Botanical Survey; and the animals by myself, with the assistance of specialists whose names are mentioned in their appropriate place.

SECTION 2.

Remarks upon the More Obvious Natural Features of the Pamirs.

In a general view, the Great and Little Pamirs are simply the broad alluvial valleys of the sources of two of the large original affluents of the River Oxus. Although the Commission stayed for some days in the eastern part of the Great Pamir, the greater portion of its time was passed in the Little Pamir, which was traversed from west to east, and could therefore be more leisurely and critically observed; so that an outline of the natural features of the Little Pamir may take the first place.

The Little Pamir—assuming its extremes to be the Andamin Pass on the west, and the Kizil Robát bluffs on the east—is the broad alluvial basin of the first fifty miles, or so, of the river Aksu. Its greatest breadth is not more than four or five miles, and it lies, east-north-east and west-south-west, at an elevation of about 13,000 feet. It is bounded north and south by grassy downs, which rise to a height of about 18,000 feet and culminate in sharp-cut peaks,—most of these, especially on their northern faces, being capped with perpetual snow. The continuity of these downs is much broken, especially on the southern side of the Pamir, by broad nullahs, which open into the Pamir almost at right-angles; every nullah having its head in a snow-field or small glacier, which drains, down a bouldery channel in the nullah bed, into the river Aksu.

The basin, or valley, of the Pamir forms a broad undulating surface, with more or less distinct remains, along its sides, of old river-terraces. These show that in past times, when probably the altitude of the mountains themselves was greater, the river Aksu ran at a much higher level than it does now. These old river-terraces are most distinct at the eastern end of the Pamir, near the Mihmanyol Pass and Kizil Robát, where they appear as sharp-cut banks of recently formed conglomerate, and as abrupt hillocks of shingle and boulders.

The surface of the Pamir, although largely covered with tussocks of grass and other stunted vegetation, often consists of bare stretches of hard sand and shingle, coated with a saline efflorescence. Here and there, especially on the old river-terraces, occur colossal boulders of gneiss and masses of limestone, which, by the chance observer, might be mistaken for ice-borne erratics; but which, by their uniformity of distribution, are clearly only "tors," or the remains of deep-seated beds that have been laid bare, and in great part denuded, by the action of the river and its numerous affluents.

The river runs with some rapidity in a broad bed of boulders, and often expands into marshes and lakelets; one chain of which, known as Chakmaktin Kul or Oi Kul, is of respectable size.

A very characteristic feature of the Pamir, in summer, are the tracts of deep grassy bog that skirt the river and all its tributaries. Equally characteristic is the rolled or beaten-down appearance of the surface soil everywhere, the evident result of a long-lying weight of snow.

The principal rocks of the Pamir, in order of abundance, are (1) black carbonaceous shales and hard argillaceous sandstones, (2) granitites, (3) quartzite conglomerate, (4) limestones, (5) true volcanic rocks.* No fossils were met with.

The shales and sandstones form the great mass of the hills that bound the Pamir, and crushed quartzite conglomerate occurs in beds of considerable thickness along the lower slopes of these hills, especially of those of the northern range. Limestone also crops out in places, all along the lower slopes of the northern range, as well as in other places to be presently mentioned. The granitites occur largely in the open Pamir, in the form of large boulders and beds of large pebbles, the river-terraces and hillocks already mentioned being formed almost entirely of the water-worn débris of these igneous rocks, though they are also found in places as colossal boulders, on the lower slopes of the hills.

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* See Mr. Holland's Report, pages 29—32, from which the specific names are taken.

The true volcanic rocks occur mostly at the eastern end of the Pamir, and consist of andesite-rhyolites associated with hard limestone-conglomerate and limestone-breccia. The red rocks from which Kizil Robát derives its name are, in fact, a range of bold bluffs and scarps consisting largely of limestone-conglomerate coloured by a ferruginous cement, and of red volcanic rock.

Associated with these volcanic rocks, but on the opposite side of the river Aksu, is a cluster of sulphuretted hydrogen springs, the temperature of which is that of a comfortable hot-bath. These springs well out on both sides of a deep ravine, the rocks exposed in which are chiefly rhyolitic andesite of a dark red colour. The largest spring has formed for itself a cone of calcareous sinter about forty feet high, and there is another extinct cone and crater of not much smaller size close by.

Incidentally, it may give some idea of the summer climate of the Pamirs to note, regarding this spring, that about noon on a cloudy day in the middle of August, although the water as it welled out of the top of the cone must have been of a temperature near 105° Fahr., yet as it trickled over the stalactites of sinter at the edge of the cone it was in part converted into icicles.

Another fact of interest regarding this spring is that it is held in great medicinal repute among the Kirghiz, especially among the women. It has, therefore, been roughly walled in and somewhat imposingly decorated with rude banners and standards of yaks' tails.

The black sandstone and shale of which the downs that bound the Pamir chiefly consist, are hard, brittle, and fissile, weathering, under the action of frost, in flakes, which, on these comparatively gentle slopes, collect to form very characteristic "shoots" of talus. On these "shoots," which as they accumulate often grow out into terraces, the "forms" of *Ovis poli* are often to be found, especially on southerly aspects.

As already stated, the Pamir, both as to its open surface and as to its slopes, is more or less covered with grasses, the commonest of which is a species identified by Mr. Duthie as *Poa attenuata*. From early times the Pamir grass has been noted for its richness. Marco Polo (Marsden's translation, London, 1818, page 142) wrote of it "such indeed is its quality that the leanest cattle turned upon it would become fat in the course of ten days." And Wood, in his journey to the source of the Oxus (London, 1841, page 365), mentions the Kirghiz telling him that "the grass of the Pamir is so rich that a sorry horse is here brought into good condition in less than twenty days." Our own experience quite accords with this, for of the many pack-animals met with on our return march from Gilgit to Kashmir, none approached our baggage-ponies in condition.

Besides grass there is a good deal of wormwood, the roots of which furnish a meagre fuel—the only fuel besides cattle-dung to be got in this part of the world.

There is no large vegetation of any kind; the biggest plant that I myself saw was a Larkspur about eighteen inches high and with a crown about a foot in diameter.

The most noticeable characters of the Pamir plants are the strength and bulk of the root; the large size and quick maturation of the flower, compared with the leaves; and the toughness and persistence of the seed-vessels. For instance, in exposed situations, it is not uncommon to find a *Primula* which consists of a large bunch of roots surmounted by a large head of flowers, with not more than two or three small leaves between, and with the dried flower-stalk and seed-capsules of the last year still attached and in perfect preservation.

These are well-known features of Alpine and boreal vegetation, and have been explained as the direct results, under Natural Selection, of a short and sudden summer following on a long and severe winter. In such circumstances the plants more likely to survive and multiply will be those in which the tendencies to store up a reserve of nutriment in a protected root rather than in an exposed stem; to mature the flower (upon which, in the first instance, the propagation of the species depends) before the leaves; and to form strong and resistent seed-envelopes, are most marked.

That the flora of the Pamir is meagre may be judged from the fact that although I gathered specimens of every plant that I saw, except of a species of Rhubarb never seen in flower, only 115 species were yielded.

The fauna of the Pamir is as poor as the flora.

Of mammals by far the commonest is the golden marmot, whose shrill danger-signal is one of the most characteristic sounds of these silent altitudes. Another common mammal is the Tibetan or Pamir hare, which from its semi-gregarious and burrowing habits resembles a rabbit rather than a hare.

Ovis poli, though certainly abundant on its own particular grounds, is more in evidence in summer by reason of the horns and portions of skulls that strew the ground everywhere.

Much the commonest bird is the horned lark. The red-billed chough is also abundant, and the common raven quickly collects about an encampment.

Along the streams the Tibetan tern is a common bird, and in every high nullah the marks of the snow-cock abound. The Ossifrage or Lammergeyer (the "Golden Eagle" of Anglo-Indians) is the principal bird of prey, and it is said that it can often be seen chasing hares.

Not a single reptile or Batrachian was found, although they were searched for in likely places; and it seems probable that neither of these classes of animals is represented at this intensely cold elevation.

Fishes, all of the Carp family, were numerous in every stream and pool, both adults and fry, the commonest being *Schizopygopsis Stoliczkæ*. It must be either this fish, or a *Schizothorax* which I identify as *S. Fedschenkoi*, that travellers in this region have spoken of as "trout." That fishes are so abundant is probably due to the facts that they have few enemies, and that food, in the form of water-snails and larvæ of chironomid flies, is plentiful. *Schizopygopsis* would generally take the small fly-spoon, and *Schizothorax* was best caught with a sunk bait of raw meat.

Insects were not numerous: the collection includes only a few species of flies and butterflies, none of which were at all abundant.

Of Crustacea, a few water-fleas and sand-hoppers were found in Chakmaktin Lake.

Two species of spiders were fairly common among boulders, in damp situations, and a third species used to frequent our tents. Unfortunately my specimens of them were lost, and with them a centipede found by Colonel Wahab in his tent, and a small collection of moths.

The Great Pamir, of which, however, I explored only a small part of the eastern end, seemed to be in all respects similar to the Little Pamir. Its surface configuration is much the same, its rocks are the same, and at Jarti Gumbaz are hot sulphuretted hydrogen springs, similar to those near Kizil Robát, but more numerous and of a higher temperature.

The vegetable and animal life is quite the same, but butterflies—chiefly meadow-browns and a species of *Parnassius*—were considerably more numerous.

It is necessary here to refer to the climate of the Pamirs only in a general way. The Commission had experience of it from the 20th July to the 16th September. During that time the most noticeable meteorological event was the high and bitterly cold wind that, springing up nearly every day in the forenoon, would last until sunset. The nights were almost without exception intensely frosty.

A succession of many fine days was uncommon.

Snow-squalls were of frequent occurrence: there was a heavy one in the morning of the 24th July, when the snow lay thick on the ground round our tents, and did not disappear until noon; and there were two equally heavy ones in the last half of August.

There was a heavy shower of rain and sleet in the forenoon of the 15th August.

By the middle of September the ice formed at night on the marshy pools near the Aksu, did not melt until late in the morning.

Before describing the zoological collection it is necessary to correct the impression, an impression which appears to be traceable to a Kirghiz statement repeated by Wood (*Journey to the Source of the Oxus*, page 364), that in summer the Pamir Lakes swarm with aquatic birds, which have come to breed.

The bar-headed goose, the Brahminy duck, and a few other ducks, were seen on Chakmaktin Lake and on Lake Victoria, in July, and on the 25th July I saw, at a distance, on Lake Victoria, a pair of ducks or geese with a young brood. Also, all through August and the latter part of July, the Tibetan tern was seen every day, and the cormorant, the red-shank, and several species of plovers and sand-pipers might be seen any day.

But that there was any great concourse of aquatic birds, more particularly of breeding birds, was as far as possible from being the case. Neither the Chakmaktin chain, nor the Victoria chain of lakes offer any attraction as a breeding ground; for their banks are low and bare, and they are singularly deficient in aquatic vegetation, and so they afford neither the cover nor the feeding-grounds required.

At the end of August, snipe, teal, ducks and geese began to appear in gradually increasing numbers, but they were all very clearly on their winter migration southwards.

SECTION 3.

A systematic Account of the Zoological Collection made on the Pamirs.

MAMMALS.

Order *CARNIVORA.*

Family CANIDÆ.

1. VULPES ALOPEX (L.) var. FLAVESCENS, Gray.—The pale variety of the common Fox.

Vulpes flavescens, Gray, Ann. Mag. Nat. Hist. XI, 1848, p. 118: Hutton, J. A. S., B. XIV, p. 344: Adams Proc. Zool. Soc., 1858, p. 516: Blyth Cat., p. 42: Blanford, Mammals of 2nd Yarkand Mission, p. 22, pl. ii.

Vulpes alopex var. *flavescens*, Blanford, Fauna Brit. India, Mammals, p. 153: W. Sclater, Cat. Mamm. Ind. Mus., Vol. II, p. 268.

This race of the common fox is not uncommon on the Pamirs. The single specimen obtained is very much lighter-coloured than any of those in the Indian Museum collection.

On one occasion Colonel Wahab and I, at an elevation of over 16,000 feet, came across one stalking a flock of snow-cock: it showed great curiosity, but not much fear, at seeing us.

[No other carnivora were obtained, but the following were seen :—

A wolf, probably the common wolf (*Canis lupus*) :

A bear, probably the brown bear (*Ursus arctus*) :

A weasel, probably the yellow-bellied or pale weasel (*Putorius alpinus*), a specimen of which was shot on the Burzil Pass in Kashmir, at an elevation nearly equal to that of the Pamir.]

Order *RODENTIA.*

Family SCIURIDÆ.

2. ARCTOMYS AUREUS, Blanford.—The Golden Marmot.

Arctomys aureus, Blanford, J. A. S. B., Vol. XLIV, pt. 2, 1875, pp. 106 and 123, and Mammalia of 2nd Yarkand Mission, pp. 33-36, pls. xi, xi *a*: W. Sclater, Cat. Mamm. Ind. Mus., Vol. II, p. 48.

During July and August the golden marmot was the commonest mammal of the Pamirs, and its cry, which consists of a prolonged whirring scream followed by several short sharp expletives, was one of the most familiar sounds. In September, however, the marmot was seldom seen or heard.

The relative length of the tail in this species varies greatly, and appears to decrease with age. Of five specimens shot on practically the same spot near Lake Victoria, two young males have the tail half, or a little more than half, the length of the head and body; two females have the tail, respectively, a little less than half, and two-fifths, the length of the head and body; while in an old male the tail is between a third and a fourth the length of the head and body.

In adults the general colour, in summer, was, as described by Blanford, tawny to rich brownish yellow, irregularly shot with black; but the tip of the tail was as often dark reddish-brown as black. The general colour, however, of a very young male was more like that of *A. hodgsoni*, Blanford—a rusty cat-grey, while half the tail was black.

The Pamir marmot is extremely alert. Severtzov states definitely that the brown bear is accustomed to dig them out of their burrows, and that the Lammergeyer also preys upon them.

Family MURIDÆ.

3. ARVICOLA BLANFORDI, Scully.—The Gilgit Vole.

Arvicola blanfordi, Scully, Annals and Magazine of Natural History (5) VI, 1880, p. 399, and P. Z. S., 1881, p. 206: Blanford, Journal, Asiatic Soc. Bengal, Vol. L., pt. 2, 1881, p. 104, pl. i., fig. 3: W. Sclater, Cat. Mamm. Ind. Mus., Vol. II., p. 91.

Microtus blanfordi, Blanford, Fauna of Brit. India, Mammals, p. 432.

Unfortunately, the label has come off the only specimen caught, and I am not absolutely certain whether it came from the Pamir, or from the heights near by to the south-west.

4. CRICETUS PHÆUS, Pall.—The Grey Hamster.

Mus phæus, Pallas, Novæ species Quadrupedum Glirium, p. 261, pl. xv*a*.

Cricetus phæus, Pallas, Zoographia Rosso-Asiatica, Vol. I., p. 163: De Filippi, Viaggio in Persia, p. 344: Blanford, Zool. and Geol. of E. Persia, p. 58, and Mammals of 2nd Yarkand Mission, p. 4, and Journal, Asiatic Soc. Bengal, Vol. XLVIII. pt. 2, 1879, pp. 96-97, and Fauna of Brit. India, Mammals, p. 436: Danford and Alston, Proc. Zool. Soc. 1880, p. 61: Scully, P. Z. S. 1881, p. 205: Oldfield Thomas, Trans. Linn. Soc. Zool., May 1889, p. 59: Radde and Walter, Zoologische Jahrbuch. Syst., etc., IV., 1889, p. 1032: W. Sclater, Cat. Mamm. Ind. Mus., Vol. II., p. 85.

Cricetus isabellinus, De Filippi, Viaggio in Persia, p. 344: Blanford, Zool. and Geol. of E. Persia, p. 59, and Fauna Brit. Ind., Mammals, p. 437: Scully, P. Z. S. 1881, p. 205.

Cricetus fulvus, Blanford, Journ. Asiat. Soc., Bengal, Vol. XLIV., pt. 2, 1875, p. 108, and Mammals of 2nd Yarkand Miss., p. 45, pl. ix., fig. 1, pl. x*b*., fig. 3, and Journ. Asiat. Soc., Bengal, Vol. XLVIII., pt. 2, 1879, pp. 96-97, and Fauna Brit. Ind., Mammals, p. 437: Scully, P. Z. S. 1881, p. 205.

The habits of this little animal have been noticed by all its observers. It was constantly found in our tents on the Pamirs, especially in the one containing Commissariat stores. Scully (*loc. cit.*) was the first to recognize the probable identity of the three species, and his opinion is adopted by Sclater. Our series of specimens quite confirm Sclater's synonomy.

Family LEPORIDÆ.

5. LEPUS TIBETANUS, Waterhouse.—The Hare of Little Tibet.

"Hare of Little Thibet," Vigne, Travels in Kashmir, Vol. II, p. 268.

Lepus tibetanus, Waterhouse, Proc. Zool. Soc., 1841, p. 7, and Nat. Hist. Mamm., Vol. II, p. 58: Günther, Annals and Magazine of Natural History, (4) XVI, p. 228: Blanford, Mammals of 2nd Yarkand Mission, p. 63, pl. iv, fig. 2: Scully, P. Z. S., 1881, p. 207: Oldfield Thomas, Trans. Linn. Soc. Zool., May 1889, p. 61: W. Sclater, Cat. Mamm. Ind. Mus., Vol. II, p. 114: Blanford, Faun. Brit. Ind., Mammals, p. 452 (*partim*).

Lepus lehmanni, Severtzov, (1873) Ann. Mag. Nat. Hist. (4) XVIII, 1876, p. 169: Scully, Journ. Asiat., Soc., Bengal, Vol. LVI., pt. 2, 1888, p. 76: Radde and Walter, Zoologische Jahrbuch. Syst., etc., IV, 1889, pp. 1054 and 1055, foot-note.

Lepus pamirensis, Günther, Ann. Mag. Nat. Hist. (4) XVI, Sept. 1875, p. 229: Blanford, Journ. Asiatic Soc., Bengal, Vol. XLIV, pt. 2, 1875, p. 110, and Mammals, 2nd Yarkand Miss., p. 67, pl. v, fig. 1, pl. v*a*, fig. 1: W. Sclater, Cat. Mamm, Ind. Mus., Vol. II, p. 114.

Lepus Stoliczkanus, Blanford, Journ. Asiat. Soc., Bengal, Vol. XLIV, pt. 2, 1875, p. 110, and Mammals of 2nd Yarkand Miss., p. 68, pl. v, fig. 2, pl. v*a*, fig. 2: W. Sclater, Cat. Mamm. Ind. Mus., Vol. II, p. 115.

Lepus biddulphi, Blanford, Journ. Asiat. Soc., Bengal, Vol. XLVI, pt. 2, 1877, p. 324.

This, the only hare seen, was extremely common on the Pamirs, and even commoner on the high slopes of the Wakhan Valley between Langar and Bezai Gumbaz, where in places it was almost gregarious.

Vigne, who truly calls it a "lank and long-legged animal", says that it sometimes makes its "form" in holes underneath rocks, but on the Little Pamir I often saw it run into deep burrows.

In the male the black tips to the ears are often more conspicuous than in the female. Sclater (Cat. Mamm. Ind. Mus., II., 115) has already expressed the opinion that *L. Stoliczkanus* and *L. pamirensis* are, in all probability, identical with *L. tibetanus*, and I fully agree with him.

L. craspedotis, which Mr. Blanford now synonomizes with *L. tibetanus*, is at once distinguished by the enormous relative size of the ears; so that Mr. Blanford's statement, in the Fauna of British India, that *L. tibetanus* is found as low as 500 feet above sea-level—if, as appears from the context, the statement is founded on the supposed identity of *L. craspedotis* with this species—needs confirmation.

For two fine specimens the collection is indebted to Colonel Wahab.

Order *UNGULATA.*

Family BOVIDÆ.

6. Ovis poli, Blyth.—The Great Pamir Sheep.

Ovis poli, Blyth, Proc. Zool. Soc., 1840, p. 62, and Ann. Mag. Nat. Hist., Vol. VII, 1840, p. 195, pl. v, figs. 1-4, and Journ. Asiat. Soc., Bengal, Vol. X, 1841, p. 858: Horsfield, Cat. Mamm. Mus. of Hon. E. I. Co., p. 176: Sclater, P. Z. S., 1860, p. 443: Severtzov, Fauna Turkestan, etc. (Moscow, 1873), pp. 84-102, 150, pls. ii. iii. v, figs. 1-2, vi, fig. 1, and Ann. Mag. Nat. Hist. (4) XVIII, 1876, pp. 171, 210, 220: Stoliczka, P. Z. S., 1874, p. 425, pl. liii: Biddulph, P. Z. S. 1875, p. 157: V. and B. Brooke, P. Z. S., 1875, pp. 514-517, figs. 4, 5: Blanford, P. Z. S., 1875, p. 540, and Mammals of 2nd Yarkand Miss., p. 83, and P. Z. S. 1884, pp. 326-329, figs. 1-3, and Fauna Brit. India, Mammals, p. 496: Grote, P. Z. S. 1876, p. 415: Prejevalski Petrs. Mitth. Erzb., XII, 1878, pp. 5, 17: Wood-Mason and Biddulph, Proc. Asiat. Soc., Beng., 1870, p. 289: Scully, P. Z. S., 1881, p. 209: Sclater, Cat. Mamm. Ind. Mus., Vol. II., p. 133.

Ovis Karelini, Severtzov, Fauna Turkestan, etc. (Moscow, 1873), pp. 84-102, 150, pls. i., v., figs. 3, 4, vi., figs. 3, 4, and Ann. Mag. Nat. Hist. (4) XVIII, 1876, pp. 171, 210, 217: V. and B. Brooke, P. Z. S., 1875, p. 512: Blanford, Mammals, 2nd Yarkand Mission, p. 80.

See also Travels of Marco Polo, trans. by Wm. Marsden, London, 1818, pp. 142, 143; and Yule's Book of Ser. Marco Polo, London, 1875, Vol. I, pp. 185, 186, and Wood's Journey to the Oxus, London, 1841, pp. 340, 368, and 2nd Ed., 1872, pp. 223, 241.

During the whole time of our stay (20th July to 16th September) the great Pamir sheep was often seen in large herds numbering sometimes over a hundred individuals, which, however, at this season, were all females and young males. The only large adult males brought into our camp were two shot on the 16th September, near Bozai Gumbaz, by Lieutenant Ossetinsky of the 16th Turkistan Line Battalion, one of which Mr. Ossetinsky was generous enough to give to me for the Indian Museum.

This and three other perfect specimens make a fine series, which will shortly be exhibited in the Indian Museum, to illustrate growth-change and the development of secondary sexual characters in this species.

The only other wild ungulate seen on the Pamirs was the Himalayan Ibex (*Capra sibirica*).

BIRDS.

In the identification of the birds I have been very materially assisted by Mr. F. Finn, Deputy Superintendent of the Indian Museum, without whose aid I should have been unable, within the time at my disposal, to come to satisfactory conclusions in a group in which there is so much conflict of opinion.

With regard to references, we have thought it sufficient to refer, where possible, to the Catalogues of Birds in the British Museum, and, in addition, to the Reports of the more important English and Russian Expeditions to Central Asia.

Order *CARINATÆ.*

Sub-order *PASSERES.*

Family CORVIDÆ.

1. Corvus corax, L.—The Raven.

Corvus corax, Sharpe, Brit. Mus. Cat. Birds, Vol. III, p. 14, and Birds of the 2nd Yarkand Mission, p. 16.

Ravens were common on the Pamirs, and collected in great numbers near the joint camp of the two Commissions at Mihmanyol.

The bell-like note referred to by Oates, on Blanford's authority, as peculiar to the Sind raven, was frequently heard. (I have often heard the same note in E. Baluchistan.)

2. Graculus graculus (L.).—The red-billed Chough.

Graculus graculus, Sharpe, Brit. Mus. Cat. Birds, Vol. III, p. 146, and Birds of the 2nd Yarkand Mission, p. 21.

The red-billed chough was extremely common on the Pamirs during the whole period of our stay. On the march up in July I did not notice it until we reached Sarhad, in the Wakhan Valley, about 10,500 feet; but on the march down, in September and October, it was common enough in the Yasin Valley, down to 8,000 feet.

Family SYLVIIDÆ.

3. Phylloscopus humii (Brooks).—Hume's Willow-warbler.

Phylloscopus humii, Seebohm, Brit. Mus. Cat. Birds, Vol. V, p. 67: Sharpe, Birds of 2nd Yarkand Mission, p. 78.

A female in good plumage appears to us to correspond with this species, of which—as also of *P. superciliosus*—we have large series for comparison. It was shot on the Little Pamir, by the banks of the Aksu.

A little bird, apparently this species, used to frequent our tents at Mihmanyol.

Family TURDIDÆ.

4. Erithacus cæruleculus (Pall.).—The red-spot Bluethroat.

Erithacus cæruleculus, Seebohm, Brit. Mus. Cat. Birds, Vol. V, p. 308.
Cyanecula cæruleculа, Sharpe, Birds of 2nd Yarkand Mission, p. 89.

A single specimen was caught alive in our camp at Mihmanyol.

5. Ruticilla erythrogaster, Güldenstadt.—Güldenstadt's Redstart.

Ruticilla erythrogastra, Seebohm, Brit. Mus. Cat. Birds, Vol. V, p. 347.
Ruticilla erythrogaster, Sharpe, Birds of 2nd Yarkand Mission, p. 88.

In its habits this species very much resembles the white-cap water-redstart. On the Pamirs it was only found above 15,000 feet, in sheltered nullahs, on rocks in or alongside mountain torrents. On this account specimens were hard to get, most of those shot being lost in the torrent.

One of our specimens is immature.

6. Saxicola montana, Gould.—Gould's Chat.

Saxicola montana, Seebohm, Brit. Mus. Cat. Birds, Vol. V, p. 384; Sharpe, Birds of 2nd Yarkand Mission, p. 85.

An adult male in winter plumage, and an immature bird.

Family ORIOLIDÆ.

7. ORIOLUS KUNDOO, Sykes.—The Indian Golden Oriole.

Oriolus Kundoo, Sharpe, Brit. Mus. Cat. Birds, Vol. III, p. 194, and Birds of 2nd Yarkand Mission, p. 24.

A young oriole caught, in an exhausted state, near our camp at Mihmanyol, on the Little Pamir, agrees with *O. galbula* in having the dusky marking of the head confined to the lores, but the wing-measurement is that of *O. Kundoo.*

Family FRINGILLIDÆ.

8. MONTIFRINGILLA BRANDTI (Bonap.).—The Sooty Mountain-finch.

Montifringilla brandti, Sharpe, Brit. Mus. Cat. Birds, Vol. XII, p. 269, and Birds of 2nd Yarkand Mission, p. 32.

Seen in July and August, in small flocks, among the flowering grasses of the lower slopes, about 15,000 feet.

Family MOTACILLIDÆ.

9. MOTACILLA PERSONATA, Gould.

Motacilla personata, Sharpe, Brit. Mus. Cat. Birds, Vol. X, p. 479, pl. v., figs. 3, 4, and Birds of 2nd Yarkand Mission, p. 56.

This wagtail was common along the banks and marshes of the River Aksu.

10. MOTACILLA CITREOLOIDES (Hodgs.).

Motacilla citreoloides, Sharpe, Brit. Mus. Cat. Birds, Vol. X, p. 507, and Birds of 2nd Yarkand Mission, p. 60.

Also common along the Aksu.

Family ALAUDIDÆ.

11. OTOCORYS PENICILLATA, Gould., var. PALLIDA, Sharpe.—Horned Lark.

Otocorys penicillata, var. *pallida*, Sharpe, Brit. Mus. Cat. Birds, Vol. XIII, p. 533.
Otocorys pallida, Sharpe, Birds of 2nd Yarkand Mission, p. 49.

This is the common lark of the Great and Little Pamirs.

Our *male* specimens show a gradation from union of the black throat-band with the black ear-coverts, to separation.

Our series includes a fledgeling chased from its parents while being fed.

[Hirundo sp.

A species, probably the common swallow (*Hirundo rustica*), which according to Severtzov (" Ibis," 1883, p. 70) passes through the Pamirs from the end of August to the end of September, was occasionally seen near Mihmanyol in August.]

Sub-order *PICARIÆ.*

Family PICIDÆ.

12. IYNX TORQUILLA, L.—The Wryneck.

Iynx torquilla, Hargitt, Brit. Mus. Cat. Birds, Vol. XVIII, p. 560 : Sharpe, Birds of 2nd Yarkand Mission, p. 110.

A single specimen was shot on the Little Pamir, near Mihmanyol. Its colour so exactly harmonized with the tones of the country, that a casual observer might have been forgiven for supposing that it illustrated what Prof. Poulton has called anticryptic " protection."

Severtzov has already reported this species from the Pamir.

It must be remembered that for many miles round there was not a tree or bush of any kind.

Family UPUPIDÆ.

13. UPUPA EPOPS, L.—The common Hoopoe.

Upupa epops, O. Salvin, Brit. Mus. Cat. Birds, Vol. XVI, p. 4: Sharpe, Birds of 2nd Yarkand Mission, p. 110.

The common Hoopoe was almost common on the Little Pamir after the middle of August, and appeared to be perfectly at home, in spite of occasional snowstorms and excessively cold nights.

Family CORACIIDÆ.

14. CORACIAS GARRULA, L.—The European Roller.

Coracias garrula, Sharpe, Brit. Mus. Cat. Birds, Vol. XVII, p. 15: Birds of 2nd Yarkand Mission, p. 113.

Several specimens were seen on the Little Pamir about the middle of August. It does not appear to have been recorded from here before.

Sub-order *STRIGES*.

Family BUBONIDÆ.

15. CARINE BACTRIANA, Hutt.—The Bactrian Owl.

Carine bactriana, Sharpe, Birds of 2nd Yarkand Mission, p. 14, pl. iii (1891).

Athene bactrianus, Hutton, Journ. Asiatic Soc., Bengal, Vol. XVI, Pt. 2, 1847, pp. 776, 777.

Carine noctua sub sp. *plumipes*, Sharpe, Brit. Mus. Cat. Birds, Vol. II, p. 137.

A young male was caught alive among the rocks, near Bozai Gumbaz. It differs from adults in our collection, obtained by Scully, Stoliczka and Aitchison, much in the same way as the young of *C. brama* differs from the adult, namely, in being of a duller shade and in having the white markings—especially those on the back of the head—less distinct. *Donor:* Major-General M. G. Gerard.

Sub-order *ACCIPITRES*.

Family FALCONIDÆ.

16. GYPAËTUS BARBATUS (L.).—The Lammergeyer.

Gypaëtus barbatus, Sharpe, Brit. Mus. Cat. Birds, Vol. I, p. 228, and Birds of 2nd Yarkand Mission, p. 6.

The Lammergeyer was common on the Pamirs.

The only specimen obtained was an adult male, in beautiful plumage, presented by His Excellency General Poválo-Schveikovsky.

17. HALIAËTUS LEUCORYPHUS (Pall.)—Pallas's Sea-eagle.

Haliaëtus leucoryphus, Sharpe, Brit. Mus. Cat. Birds, Vol. I, p. 308, and Birds of 2nd Yarkand Mission, p. 8.

The only specimen obtained is a young male in dirty and abraded condition; but specimens in adult plumage were often seen along the R. Aksu.

18. MILVUS MIGRANS, Bodd.—Kite.

Milvus korschun, Sharpe, Brit. Mus. Cat. Birds, Vol. I, p. 322.

Milvus ater, Severtzov, Birds of the Pamir, in "Ibis," 1883, p. 53.

Only one specimen was seen: it was shot near Mihmanyol.

[BUTEO FEROX (Gm.).

Buzzards, which were almost certainly this species, frequented our camp near Mihmanyol. They were too wary to give a shot within killing distance.]

[FALCO REGULUS, Pall.

A little hawk, which was almost certainly the Merlin, was once seen on the Little Pamir, at about 15,000 feet.]

Sub-order *HERODIONES.*

Family ARDEIDÆ.

19. Ardea cinerea, L.—The common Heron.

Ardea cinerea, Linn., Syst. Nat., ed. 12, I, 236. Sharpe, Birds of 2nd Yarkand Mission, p. 124.

Only a few were seen, and these only at one spot in the marshes of the R. Aksu, near Mihmanyol.

They were extremely shy, and only one was shot.

Family IBIDIDÆ.

20. Plegadis falcinellus, L.—The Glossy Ibis.

Tantalus falcinellus, Linn., Syst. Nat., ed. 12, I, 241.
Plegadis falcinellus, Sharpe, Birds of 2nd Yarkand Mission, p. 124.

A male, with adult plumage nearly complete, was shot in the marshes of the Little Pamir.

This species does not seem to have been before recorded from the Pamirs.

Sub-order *STEGANOPODES.*

Family PHALACROCORACIDÆ.

21. Phalacrocorax carbo, L.—The common Cormorant.

Pelecanus carbo, Linn., Syst. Nat., ed. 12, I, 216.
Phalacrocorax carbo, Sharpe, Birds of 2nd Yarkand Mission, p. 127.

An immature female, in good condition, was shot on some pools of the Aksu. Several specimens were seen.

Sub-order *ANSERES.*

Family ANATIDÆ.

[Anser indicus (Lath.).

Two specimens of the bar-headed goose were shot by a sepoy of the escort on Lake Victoria. Towards the end of August large flocks of geese were seen migrating south-westwards, flying higher than the highest peaks (18,000 to 19,000 feet); they may, perhaps, have been this species.]

22. Tadorna casarca (L.) et auctorum.—The Brahminy Duck.

Anas rutila, Pallas, Zoogr. Ross. Asiat., II, 242.
Tadorna casarca, Sharpe, Birds of 2nd Yarkand Mission, p. 128.

This species was seen at all times on the Pamirs.

With reference to the synonym *Vulpanser* given by Pallas, *loc. cit.*, under this species, I may mention that I myself mistook the first specimen, which was feeding alone on a dried-up marsh by the Aksu, for a fox.

23. Anas (Querquedula) circia, L., et auctorum.—The Indian blue-winged Teal.

Anas circia, Linn. Syst. Nat., ed. 12, I, 204.
Querquedula circia, Sharpe, Birds of 2nd Yarkand Mission, p. 131.

This species was very common among the pools and marshes of the Aksu, after the 20th August. No full-plumaged males were noticed.

Sub-order *LIMICOLÆ.*

Family CHARADRIIDÆ.

24. Charadrius fulvus, Gm.—The Asiatic Golden Plover.

Charadrius fulvus, Seebohm, Charadriidæ, p. 99 : Sharpe, Birds of 2nd Yarkand Mission, p. 136.

This species gradually became common on the Little Pamir, after the middle of August. All the specimens procured show much of the black underparts of the breeding plumage.

25. Charadrius mongolicus, Pall.—The Mongolian Sand Plover.

Charadrius mongolicus, Seebohm, Charadriidæ, p. 147.
Aegialitis mongolicus, Sharpe, Birds of 2nd Yarkand Mission, p. 137.

This species was not uncommon in August. Three of our specimens—two females and a male—are in immature plumage.

26. Totanus calidris (L).—The common Redshank.

Totanus calidris, Seebohm, Charadriidæ, p. 353 : Sharpe, Birds of 2nd Yarkand Mission, p. 140.

Very common, and very tame ; and very good eating, notwithstanding Sir Thomas Browne's opinion that it is " no dainty dish."

One of our male specimens is in very abraded breeding plumage.

27. Totanus glottis (L.)—The Greenshank.

Totanus glottis, Seebohm, Charadriidæ, 1888, p. 355 : Severtzov, Ibis, 1883, p. 74.

Only a few were seen.

28. Totanus stagnatilis, Bech.—The Marsh Sandpiper.

Totanus stagnatilis, Seebohm, Charadriidæ, p. 357.

This species does not seem to have been before recorded from the Pamirs.

29. Totanus glareola (L.)—The Wood Sandpiper.

Totanus glareola, Seebohm, Charadriidæ, p. 365 : Sharpe, Birds of 2nd Yarkand Mission, p. 141.

30. Totanus hypoleucus (L.)—The common Sandpiper.

Totanus hypoleucus, Seebohm, Charadriidæ, p. 371.
Tringoides hypoleucus, Sharpe, Birds of 2nd Yarkand Mission, p. 141.

31. Totanus pugnax (L.)—The Ruff and Reeve.

Totanus pugnax, Seebohm, Charadriidæ, p. 373.
Machetes pugnax, Sharpe, Birds of 2nd Yarkand Mission, p. 142.

Fairly common at the end of August.

32. Strepsilas interpres (L.)—The Turnstone.

Strepsilas interpres, Seebohm, Charadriidæ, p. 410 : Sharpe, Birds of 2nd Yarkand Mission, p. 139.

Our specimens include a male in breeding plumage.

33. Tringa subarquata (Güldenstädt).—The Curlew Sandpiper.

Tringa subarquata, Seebohm, Charadriidæ, p. 419 : Sharpe, Birds of 2nd Yarkand Mission, p. 142.

One of our specimens is a male showing considerable remains of breeding plumage.

[Scolopax sp.

A few snipe began to be seen after the middle of August.]

Sub-order *GAVIÆ.*

Family LARIDÆ.

34. LARUS, sp.

An immature Herring Gull was shot on the Aksu by one of the Cossacks, and was presented to the collection by His Excellency General Poválo-Schveikovsky. It was the only individual seen.

35. STERNA TIBETANA, Saunders.—The Tibetan Tern.

Sterna tibetana, Saunders, Proc. Zool. Soc., 1876, p. 649 : Sharpe, Birds of 2nd Yarkand Mission, p. 135.

This species was common along all the rivers and lakes of the Pamirs.

The feet and base of beak are orange red.

Sub-order *COLUMBÆ.*

Family COLUMBIDÆ.

36. COLUMBA RUPESTRIS, Pall.—The Pale Rock-pigeon.

Columba rupestris, Salvadori, Brit. Mus. Cat. Birds, Vol. XXI., p. 250 : Sharpe, Birds of 2nd Yarkand Mission, p. 116.

Not uncommon on the Little Pamir. Three immature specimens, one still showing the nestling down on the neck, but nevertheless flying strongly, were shot in the latter half of August.

37. TURTUR TURTUR (L.)—The common Turtledove.

Turtur turtur, Salvadori, Brit. Mus. Cat. Birds, Vol. XXI, p. 396.

Turtur auritus, Sharpe, Birds of 2nd Yarkand Mission, p. 118.

Severtzov (" Ibis, " 1883, p. 71) has already reported the occurrence of this bird on the Pamirs, where, and for many miles around, there is not a tree or a bush to be found.

[Sub-order *GALLINÆ.*]

[TETRAOGALLUS, sp.]

[A species of Snowcock, probably *Tetraogallus himalayensis*, was common in the high nullahs up to the snowline.]

FISHES.

Order *PHYSOSTOMI.*

Family CYPRINIDÆ.

1. SCHIZOTHORAX FEDSCHENKOI, Kessler.

Schizothorax fedschenkoi, Kessler, Nouveaux Memoires, Moscou, 1872, X, p. 11, figs. 16-18, and Fedschenko's Reise in Turkistan, Pisces, p. 13, pl. ii., figs. 9-10.

Very common in the weedy reaches of the R. Aksu.

The fish caught by Stoliczka in the Oxus at Kala Panja, and described and figured by Day (P. Z. S. 1876, p. 787, and Fishes of 2nd Yarkand Mission, p. 13, pl. ii, figs. 9-10) as *S. microcephalus* appears to be extremely like Fedschenko's species: unfortunately I cannot find the specimen in the Indian Museum collection.

2. SCHIZOPYGOPSIS STOLICZKÆ, Stdr.

Schizopygopsis Stoliczkæ, Steindachner, Verh. zool.-bot. Ges. Wien XVI, 1866, p. 786, pl. xvi, fig. 2: Günther, Catalogue of Fishes, Vol. VII, p. 170: Day, P. Z. S. 1876, p. 791, and Fishes of 2nd Yarkand Mission, p. 9, pl. ii., fig. 2, and Fishes of India, p. 531, pl. cxxiv, fig. 2, and Fauna of Brit. India, Fishes, Vol. I, p. 251, fig. 89: Herzenstein, Pzejevalski Reisen, Fische, p. 191, pl. xvi, fig. 3.

This is an extremely common fish in the streams and rivers of the Pamirs, growing to a length of over thirteen inches.

3. SCHIZOPYGOPSIS SEVERTZOVI, Herz.—Plate I., fig. 1.

Schizopygopsis Severtzovi, Herzenstein, Pzejevalski Reisen, Fische, p. 196, pl. xvi, fig. 2.

I was at first disinclined to agree with Herzenstein in separating this species from *S. Stoliczkæ*, but on comparing the large series of the latter in the Indian Museum collection with those collected by myself, among which are numerous spawning males and females, I can find five ripe males and a ripe female, all taken at the same spot, which differ constantly from ripe adults of *S. Stoliczkæ* in the following characters:—

(1) they are smaller, sexually-mature individuals not being longer than 175 millim.; whereas I can find no sexually-mature *S. Stoliczkæ* less than 200 millim. long, while most are about 250 millim., and some are nearly 350 millim.;

(2) the body is higher, its height in the adult being one-sixth of its total length; whereas in typical adults of *S. Stoliczkæ* the body height is only one-seventh or one-eighth the total length;

(3) as pointed out by Herzenstein, the anterior end of the mouth-cleft is on a level with the lower edge of the orbit, whereas in *S. Stoliczkæ* it is altogether below the level of the orbit. This is due to the fact that in *S. Severtzovi*;

(4) the eye is larger, its diameter in sexually-mature adults being one-fourth, or nearly one-fourth, the length of the head; whereas in sexually-mature adults of *S. Stoliczkæ* its diameter is only one-fifth to one-sixth the length of the head.

The six adults here separated as *S. Severtzovi* all came from a small ice cold streamlet which seems to have only a periodic connexion with larger waters, so that, after all, they may be only dwarfs of *S. Stoliczkæ*.

4. NEMACHILUS TENUIS, Day.

Nemachilus tenuis, Day, P. Z. S., 1876, p. 796, and Fishes of 2nd Yarkand Mission, p. 15, pl. v, fig. 4.
Nemachilus Stoliczkæ leptosoma (part), Herzenstein, Pzejevalski Reisen, Fische, p. 23, pl. i, fig. 2.

A large number of ripe adults were taken in a streamlet on the Great Pamir, the largest being 6½ inches long.

In Day's figure, which I have compared with Day's types in our collection, the barbels are too long.

MOLLUSCA.

Order *GASTROPODA PULMONATA*.

Family LIMNÆIDÆ.

Two species, and perhaps three varieties, of freshwater snails were fairly common in Lake Victoria and in the overflow pools of the R. Aksu.

I have compared them with Stoliczka's specimens from the same locality, which were named by Nevill and are in the Indian Museum, and I have also sent specimens to Mr. Edgar Smith of the British Museum, who has kindly given me a reserved opinion upon them.

One of the Lake Victoria species is the variety of *Limnæa auricularia*, L., mentioned by Nevill in the "Mollusca of the 2nd Yarkand Expedition," page 6, and this opinion is confirmed by Mr. Smith. The other species from

Lake Victoria is the *Limnæa defilipii* var. *sirikulensis* of Nevill (*op. cit.*, page 7). Neither our specimens nor Stoliczka's correspond with Issel's figure (Moll. Persia, pl. iii, figs. 62, 63), and Nevill's determination seems open to some doubt. Mr. Smith inclines to consider this second Lake Victoria species as a variety of *Limnæa lagotis*, Schröter.

The third species, or variety, from the R. Aksu, is regarded by Mr. Smith as probably a variety of *Limnæa lagotis*, Schr. I may here mention that the Lake Victoria variety of *Limnæa auricularia*, L., is extremely like figs. 4, 4*a* of plate 17 of Jacquemont's "Voyage dans l'Inde."

INSECTS.

Order *LEPIDOPTERA.*

Sub-order *RHOPALOCERA.*

In the preparation of the report upon the butterflies, both of the Pamirs and of Kashmir, I have been greatly indebted to Mr. L. de Nicéville, the well-known authority on this branch of entomology, who not only identified such species as I could not make out, but also was kind enough to examine the entire collection, criticizing and correcting the identifications and synonomy, and giving to the whole the sanction of his high authority. With regard to references, we have given only such as are necessary.

Family NYMPHALIDÆ.

KARANASA HUEBNERI (Felder).

Satyrus huebneri, Felder, "Novara" Lepidoptera, Vol. III, p. 494, No. 855, pl. lxix, figs. 8, 9. ♀: Romanoff Mémoires sur les Lépidoptères, Vol. IV, Le Pamir et sa Faune Lépidoptérologique par Groum-Grshimaïlo, p. 463, No. 153, pl. XV, figs. 3*a*, 3*b*, ♂, ♀.

Hipparchia huebneri, Marshall and de Nicéville, Butterflies of India, Vol. I, p. 189, No. 183.

Hipparchia cadesia, Moore, P. Z. S., 1874, p. 565, No. 1, p. lxvi, fig. 7, ♂, and Butterflies of 2nd Yarkand Mission, p. 1: Marshall and de Nicéville, Butterflies of India, Vol. I, p. 190, No. 184.

Karanasa huebneri, Moore, Lepidoptera Indica, Vol. II, p. 39, pl. 101, figs. 3, 3*a*, ♀, ♂.

This was by far the commonest butterfly of the Great Pamir, near Lake Victoria, at the end of July. All our specimens are small, and all but one are extremely light in colour. In repose this species used always to lie over on its side, to escape the high wind.

2. CHORTOBIUS HILARIS (Staudinger).

Epinephele hilaris, Staudinger, Stettin Entomol. Zeitschr, Vol. XLVII, 1886, p. 249.

Several specimens were taken on the Great Pamir in July.

Groum-Grshimaïlo, *Faun. Lép. Pamir*, p. 493, appears to regard this species as identical with, or at most a variety of, *C. pulchella* (Feld.). Our specimens all correspond exactly with an authentic specimen of *C. hilaris* in the Indian Museum collection.

3. ARGYNNIS VITATHA, Moore.

Argynnis vitatha, Moore, P. Z. S., 1874, p. 568: de Nicéville, Butterflies of India, Vol. II, p. 136, No. 427.

Found on both the Great and the Little Pamir. Groum-Grshimaïlo, *Faun. Lép. Pamir*, p. 439, regards this butterfly as identical with *Argynnis aglaia*, L., with which opinion we are inclined to agree.

4. PYRAMEIS CARDUI (Linn.).

Pyrameis cardui (L.), Kirby, Synon. Cat. Diurnal Lepidoptera, p. 185: Moore, Butterflies of 2nd Yarkand Mission, p. 2: de Nicéville, Butterflies of India, Vol. II, p. 227, No. 520.

Vanessa cardui, Groum-Grshimaïlo, Faun. Lép. Pamir, p. 426, No. 118.

The Painted Lady was found only near Jarti Gumbaz, on a slope covered with the labiate plant *Nepeta supina*, which has, perhaps, the most attractive flower of this region.

Family LYCÆNIDÆ.

5. LYCAENA LEHANA, Moore.

Polyommatus lehanus, Moore, Ann. Mag. Nat. Hist. (5) I, 1878, p. 230, and Butterflies of 2nd Yarkand Mission, p. 6, pl. i, fig. 6.

Lycæna pheretes, Hb. var. *lehana* (Moore), Groum-Grshimaïlo, Faun. Lép Pamir, p. 389, No. 87, pl. x, figs. 4*a*, 4*b*, ♂. ♀.

Found on the Great Pamir.

6. LYCAENA HUNZA, Groum-Grshimaïlo.

Lycaena hunza, Groum-Grshimaïlo, Faun. Lép. Pamir, in Romanoff's Mem. Lep., IV, 1890, p. 397, No. 93, pl. xv, fig. 2.

From the Great Pamir.

Our specimens, two in number, were determined by Dr. Staudinger of Dresden.

Family PAPILIONIDÆ.

7. MANCIPIUM DEOTA, de Nicéville.

Mancipium deota, de Nicéville, Journ. Asiatic Soc., Bengal, Vol. XLII, pt. 2, 1883, p. 82, No. 24, pl. ix, fig. 10, ♂.

Pieris roborowskii, Alphéraky, Memoires sur les Lépidoptères, Vol. V, p. 69, No. 5, pl. iv, figs. 3*a*, 3*b*, ♂, ♀.

A single specimen, the only one seen, was taken on the Great Pamir.

8. COLIAS EOGENE, Felder.

Colas eogene, Felder, "Novara" Lepidoptera, Vol. II, p. 196, No. 197, pl. xxvii, fig. 7: Groum-Grshimaïlo, Faun. Lép. Pamir, p. 329, No. 39, pl. v., figs. 1*a*, 1*b*, 1*c*, ♂, ♀.

A male and two females from the Great Pamir, and a female from the Little Pamir.

9. PARNASSIUS EPAPHUS, Oberthür.

Parnassius jacquemontii, Blanchard, in Jacquemont's Voyage dans l'Inde, Vol. IV, Zool., Insectes, p. 16, No. 5, pl. i, figs. 3, 4: Gray, Catalogue of Lepidopterous Insects, Brit. Mus., pt. I. *Papilionida*, p. 75, No. 348, pl. xii, figs. 1, 2: Moore, Butterflies of 2nd Yarkand Mission, p. 5.

Parnassius epaphus, Oberthür, Etudes d'Entomologie, Vol. IV, 1879, p. 23, No. 20.

Not uncommon on the southern slopes of the Great Pamir at about 15,000 feet.

Family HESPERIDÆ.

10. HESPERIA CASHMIRENSIS (Moore).

Pyrgus cashmirensis, Moore, P. Z. S., 1874, p. 274, No. 103, pl. xliii, fig. 7.

A single specimen, the only one seen, was caught on the Great Pamir.

Order *DIPTERA*.

Family TIPULIDÆ.

[1. CHIRONOMUS sp.

A species of *Chironomus* was extremely common on the Pamirs; but unfortunately my specimens were all lost along with my specimens of Pamir spiders and moths.

On sunny days these flies were an indescribable nuisance by getting into one's eyes, ears and nostrils.

On the 24th July the surface of the shallow pools at the eastern end of Lake Victoria was covered with a thick layer of their drowned bodies.

None of these flies were observed to be luminous.]

2. PACHYRHINA PRATENSIS, L.

Pachyrhina pratensis, Macquart, Hist. Nat. des Insectes Diptères, Vol. I, p. 88.

A single specimen was taken on the Great Pamir. It is not in the best preservation ; but it agrees with Macquart's description, and with authentically named specimens from Europe in the Indian Museum collection.

Family TABANIDÆ.

3. TABANUS sp.

A species of *Tabanus* was common on the Pamirs, especially in damp grassy nullahs at an elevation of about 15,000 feet—the feeding ground of *Ovis poli*.

I am unable to name it from the Indian and European specimens in the Indian Museum collection.

Family TACHINIDÆ.

4. ECHINOMYIA sp. 1.

A single specimen of an *Echinomyia* near *E. ferox* (of which there are authentically named specimens in the Indian Museum) was taken in the Wakhan Valley, near the entrance into the Little Pamir.

5. ECHINOMYIA sp. 2.

Another Tachinid, differing only from Macquart's definition of the genus in having the whole abdomen thickly covered with long bristles, was found on the Little Pamir. It resembles a bumble-bee even more remarkably than do the species of *Volucella*, not only in hairiness but also in coloration.

CRUSTACEA.

Order *AMPHIPODA.*

Family GAMMARIDÆ.

1. GAMMARUS PULEX, L.

Gammarus pulex, Milne Edwards, Hist. Nat. Crust., Vol. III, p. 48.

Gammarus fluviatilis, Spence Bate, Cat. Amphipod. Crust., Brit. Mus., pp. 207 and 380, pl. xxxvii, fig. 1.

My specimens have not been compared with European specimens, but they agree with the descriptions and figures of Spence Bate and other authors. This species was found in some of the Pamir lakes as well as in L. Zartighar near the Baroghil Pass.

Order *PHYLLOPODA.*

Family BRANCHIPODIDÆ.

2. BRANCHIPUS (CHIROCEPHALUS) BOBRINSKII, n. sp.—Plate III, figs. 1, 1*a*.

Closely resembles *Chirocephalus diaphanus* (*vide* Baird, Nat. Hist. of British Entomostraca, p. 53, pls. iii, iv, v; and Monograph of the *Branchipodidæ*, Proc. Zool. Soc., 1852, p. 23) in all particulars except (1) that it is much smaller (both sexes); (2) that the antennules of the male are much larger, their length, when extended, being nearly equal to that of the thorax; and (3) that the toothed plate of the base of the second joint of the antennules is smaller and is distinctly pedicled.

Males and ovigerous females were caught in July, in the Chakmaktin Lake, by M. Bogoyevlenski, naturalist with Count Bobrinski.

The latter gentleman very generously gave them to me, and I have therefore named the species after him.

Family DAPHNIIDÆ.

3. DAPHNIA sp.—Plate III, fig. 2.

A single female, with large eggs in the brood-sack, was taken along with *Branchipus* in the Chakmaktin Lake.

It agrees closely with *Daphnia pulex*, except that it is very much larger, its length being nearly 4 millim., and it has a beak shaped like a turtle's. It differs from the description of *D. magna* in the form of the shell. If, as appears probable, it is an unnamed species, I would propose the name *bogoiavlenskii* for it.

SECTION 4.

A List of the Plants collected on the Pamirs.

By J. F. Duthie, Esq., B.A., F.L.S., Director of the Botanical Department of Northern India.

RANUNCULACEÆ.*

1. RANUNCULUS AQUATILIS, *Linn.*, var. trichophyllus, *Chaix.*

Shores of Lake Victoria and neighbouring lakelets 13-14,000 ft. Herb. No. 17673; in marshes by the R. Aksu. Herb. No. 17672.

This variety is abundant in North-West India, extending from the plains up to 13,000 ft. on the Western Himalaya; it also occurs in Kashmir and W. Tibet. As an aggregate species *R. aquatilis* is widely distributed in temperate regions.

2. RANUNCULUS PULCHELLUS, *C. A. Meyer*, var. longicaulis, *C. A. M.*

Passing into var. pseudo-hirculus, *Trautv.*

Occurs abundantly on both the Great and Little Pamir, in marshy and boggy land bordering running streams up to an elevation of at least 14,000 ft. Herb. No. 17676.

R. pulchellus and its varieties occur on the inner Himalayan ranges, in Afghanistan and through W. Tibet to Siberia and Mongolia.

3. RANUNCULUS HYPERBOREUS, *Rottb.*, var. natans.

In marshes along the R. Aksu, 13-14,000 ft. Herb. No. 17671.

Inner Alpine Himalaya, extending to the Arctic regions.

var. PARVISPATULUS (*Bruhl*).

Sandy shore of Lake Victoria, 13-14,000 ft. Herb. No. 17674.

4. RANUNCULUS RUFISEPALUS, *Franchet.*

In moist or drying ground up to at least 15,000 ft. Herb. No. 17675.

Found also in Turkistán.

5. DELPHINIUM CASHMIRIANUM, *Royle*, var. Jacquemontianum (Camb.).

Rare: found only in stony ground alongside running water in sheltered situations near the heads of nalas, not lower than 15,000 ft. Herb. No. 17677.

W. Himalaya and Tibet.

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* For the identification of the plants belonging to this family I have availed myself of the kind assistance of Mr. P. Bruhl, of the Sibpur Engineering College, who has made a special study of the Ranunculaceæ. To Surgeon-Captain Prain, Curator, Royal Botanic Garden, Sibpur, I am also much indebted for the help he has afforded, especially with regard to the families Papaveraceæ and Labiatæ, and the genus Pedicularis. For the correct naming of the grasses I owe many thanks to Sir Joseph Hooker, who is at present preparing a monograph of this family for the final volume of the "Flora of British India."

PAPAVERACEÆ.

6. Papaver nudicaule, *Linn.*, var. rubro-aurantiaca, *Fischer* (P. croceum *Ledeb*).

Not common; found in sheltered situations, usually over 14,000 ft. Herb. No. 17686.

Kashmir, W. Tibet, Afghanistan, Alps of Europe, extending to the Arctic region.

7. Corydalis stricta, *Steph.*

Seen only once, on a dry slope near Jarti Gumbáz at about 13,500 ft. Herb. No. 17687.

W. Tibet, Ladák, Siberia.

Surgeon-Captain Prain informs me that this is the true original form of *C. stricta*, Steph., which differs somewhat from the plant described in Fl. Brit. Ind., I. 126.

CRUCIFERÆ.

8. Draba alpina, *Linn.* ?

Pamir region, 13-14,000 ft. Herb. No. 17683.

Alpine and Arctic regions in Asia, Europe, and America.

9. Draba lasiophylla, *Royle.*

Pamir region 13-14,000 ft. Herb. No. 17679.

Alpine Himalaya, Tibet, Turkistán.

10. ? Draba hyperborea, *Desv.*—(D. grandis, DC.; Delless, Ic. Sel. II., t. 47).

Pamir region, 13-14,000 ft. Not very common, and rarely found in flower. Herb. No. 17678.

Northern America and Arctic region.

The absence of sufficiently developed ovules renders the identification of this plant uncertain, though very distinct-looking as a crucifer. It has bright red flowers, and the leaves resemble those of *Christolea crassifolia.*

11. Malcolmia nana, *Boiss.*—(Sisymbrium binerve, *C. A. Meyer*; Jaub. and Spach. Ill. Or. t. 298).

Pamir region. Not common: found only on bare shaly ground, 13-15,500 ft. Herb. No. 17681.

Caspian and Mediterranean regions.

12. ? Smelovskia sp.

Fairly common, occurring usually in mass on the dry parts of the open Pamir, 13-14,000 ft. Herb. No. 17685.

A remarkable looking plant, 6-7 inches high, with a thick woody rootstock, and pectinately pinnatifid leaves, which are densely white tomentose; flowers cream-coloured, crowded in a compact panicle; pods short ovoid; cotyledons incumbent.

13. ? Smelovskia sp.

Shores of Lake Victoria, 13-14,000 ft. Herb. No. 17682.

This looks like an annual, or at most a biennial. The pinnatifid leaves are greener and less tomentose than in the preceding; the flowers are rather smaller, and the racemes laxer in fruit.

14. **Erysimum** sp., near E. lanceolatum, *R. Br.* (E. pumilum, *Gaud.*).

Fairly common and growing usually in masses on the dry parts of the open Pamir, 13-14,000 ft. Herb. No. 17684.

15. Chorispora sabulosa, *Camb.*

Pamir region, 13-14,000 ft. Herb. No. 17680.

W. Himalaya, Tibet, Afghanistan.

CARYOPHYLLEÆ.

16. Lychnis himalayensis, *Edgew.*

Found only once, growing in sandy soil on the open Pamir, alongside the R. Aksu, 13-14,000 ft. Herb. No. 17689.

Alpine Himalaya, W. Tibet, Ladák.

17. Cerastium trigynum, *Vill.*

Abundant amongst the grass in the open Pamir, 13-14,000 ft. Herb No. 17690.

W. Himalaya, Tibet, Afghanistan to Siberia and Arctic regions.

18. Cerastium sp.

Pamir region, 13-14,000 ft. Herb. No. 17690 (a).

19. Stellaria glauca, *With.*

Amongst damp grass along the R. Aksu, 13-14,000 ft. Herb. Nos. 17688, 17691, 17692.

W. Himalaya, Tibet, to Europe and Siberia.

TAMARISCINEÆ.

20. Myricaria germanica, *Desv.*

Seen only once in a dried-up channel of the R. Aksu, 13-14,000 ft. Herb. No. 17693.

Temperate and Alpine Himalaya, W. Asia, Europe.

GERANIACEÆ.

21. Geranium tuberaria, *Camb.*

In sheltered nalas in the Pamir region, not common; 13-14,000 ft. Herb. No. 17694.

W. Himalaya and Kashmir.

LEGUMINOSÆ.

22. Astragalus tibetanus, *Benth.*

Pamir region, 13-14,000 ft. Herb. No. 17699.

W. Tibet, Ladák, Afghanistan, Kashmir.

23. Astragalus sp., near A. purpurascens, *Bunge.*

Pamir region, 13-14,000 ft. Herb. No. 17700.

24. **Oxytropis** sp., near O. tatarica, *Jacquem.*

Pamir region, 13-14,000 ft. Herb. No. 17701.

25. **Oxytropis microphylla**, *D. C.*

In stony dry water-courses in the Pamir region, at about 13,000 ft.; not common. Herb. No. 17702.

Alpine Himalaya and Tibet.

26. **Oxytropis** sp.

One of the commoner plants of the Great and Little Pamir growing in clumps in dry ground, 13-14,000 ft. Herb. Nos. 17695, 17698.

A very showy plant with reddish-purple flowers, and silvery pubescent foliage; rootstock woody and much branched.

27. **Oxytropis** sp.

Pamir region, 13-14,000 ft. Herb. No. 17696.

Flowers purple, on elongated peduncles.

28. **Oxytropis** sp., near O. glacialis, *Benth.*

Growing in masses amongst grass in sandy soil along the R. Aksu 13-14,000 feet. Herb. No. 17697.

ROSACEÆ.

29. **Potentilla fruticosa**, *Linn.*, var.

Pamir region, 13-14,000 ft. Growing among boulders in certain nalas, but not common. Herb. No. 17703.

Temperate and Alpine Himalaya, Kashmir, W. Tibet, to Northern Asia and Europe.

30. **Potentilla bifurca**, *Linn.*

One of the commoner plants of the Great and Little Pamir, growing on dry ground in the open Pamir, 13-14,000 ft. Herb. No. 17705.

Inner Alpine Himalaya, Tibet, to E. and N. Europe.

31. **Potentilla sericea**, *Linn.*, var.

Common on the Great and the Little Pamir, 13-14,000 ft. Herb. No. 17704.

W. Alpine Himalaya, Tibet, Afghanistan to N. China and N. America.

32. **Potentilla sericea**, *Linn.*, var., approaching P. multifida, *Linn.*

One of the common plants of the Great and Little Pamir, growing on dry ground everywhere, 13-14,000 ft. Herb. No. 17706.

SAXIFRAGACEÆ.

33. **Saxifraga cernua**, *Linn.*

Pamir region, 13-14,000 ft. Herb. No. 17707.

W. Himalaya and Tibet to Europe, N. America, and Arctic regions.

34. **Saxifraga hirculus**, *Linn.*

Very common in boggy ground along the R. Aksu and its affluents, up to nearly 15,000 ft. Herb. No. 17709.

Alpine Himalaya, Alps of Europe, Caucasus, Arctic region.

35. **Saxifraga flagellaris**, *Willd.*

Among boulders near melting snow, at about 15,000 ft. Herb. No. 17708. Alpine Himalaya, N. Asia, Arctic region and Rocky Mountains.

CRASSULACEÆ.

36. **Sedum rhodiola**, *D. C.*?

Pamir region 13-14,000 ft. Herb. No. 17710.
Alps of Asia, Europe and America, extending to the Arctic regions.

37. **Sedum crenulatum**, *H. f.* and *T.*

In rocky dried-up water-courses up to about 14,000 ft. Herb. No. 17711.
Alpine Himalaya.

HALORAGEÆ.

38. **Hippuris vulgaris**, *Linn.*

In marsh pools by the R. Aksu, 13-14,000 ft. Herb. No. 17713.
Kashmir, Tibet, and Afghanistan to Europe and N. and S. America.

UMBELLIFERÆ.

39. **Trachydium Roylei**, *Lindl.*

In nalas alongside running water, 14-15,000 ft. Herb. No. 17712.
Alpine Himalaya and W. Tibet.

COMPOSITÆ.

40. **Aster heterochæta**, *Benth.*

Plentiful near melting snow at about 15,000 ft. Herb. No. 17723.
Alpine Himalaya, Tibet, Altai.

41. **Aster** sp. near A. turkestanicus, Franchet (Diplopappus turkestanicus, *Regel and Schmalh.*

Pamir region, 13-14,000 ft. Herb. No. 17716.

42. **Erigeron alpinus**, *Linn.*, var. pulchella (*Trautv*).

Pamir region, 13-14,000 ft. Herb. Nos. 17717, 17718.

In the Saharanpur herbarium are specimens of the same variety collected by Younghusband in 1891, near the Tagh-dum-bash Pamir; from near Gilgit 15,000 ft. (Colonel Tanner); and from the Drás Valley, 11-12,000 ft. (Duthie). The specimens bearing the number 17718 resemble as nearly as possible a plant received from St. Petersburgh under the name of Erigeron azureus, *Regel*, and collected in Turkistán in 1882.

43. **Erigeron andryaloides**, *Benth.*

Found on the northern slope of a hill near the Urta Bel Pass, at about 15,000 ft. Herb. No. 17729.

Inner W. Himalaya and Tibet. I have specimens also from the Tagh-dum-bash Pamir collected by Younghusband in 1891.

44. LEONTOPODIUM ALPINUM, *Cass.*

Very common on the slopes up to 15,000 ft. Herb. No. 17721.

Alpine Himalaya, Tibet, Central Asia, and Alps of Europe (" Edel-Weiss ").

45. ALLARDIA GLABRA, *Dcne.*

Usually on stony ground near running water, at about 14,000 ft., but not common. Herb. No. 17732.

Inner Alpine Himalaya, W. Tibet, and Ladák.

46. CHRYSANTHEMUM RICHTERIA, *Benth.*

Fairly common, but not often found in flower, 13-14,000 ft. Herb. No. 17721.

Kashmir, W. Tibet, Sungaria.

47. TANACETUM TIBETICUM, *H. f.* and *T.*

Fairly common in dry places on the open Pamir, 13-14,000 ft. Herb. No. 17734.

W. Tibet.

48. TANACETUM NANUM, *C. B. Clarke.*

Pamir region 13-14,000 ft. Herb. No. 17733.

W. Tibet.

49. ARTEMISIA, sp., near A. minor, *Jacquem.*

One of the commoner plants of the Great and Little Pamir, growing on dry ground everywhere, 13-14,000 ft. Herb. No. 17730.

50. ARTEMISIA DESERTORUM, *Spreng.*

Pamir region 13-14,000 ft. Herb. No. 17724.

W. Himalaya, Kashmir, Tibet, Turkistán, Siberia. There are specimens in the Saharanpur herbarium collected by Russian botanists in the Pamir region and in Turkistán, and named A. pamirica, *C. Winkl.* I do not see how they differ from A. desertorum.

51. SENECIO CORONOPIFOLIUS, *Desf.*

Pamir region, 13-14,000 ft. Herb. No. 17722.

W. Himalaya, Kashmir, Afghanistan to Europe and N. Africa.

52. SENECIO, sp. (Section Ligularia).

In drying water-courses, sometimes alongside running streams, 14-15,000ft., but not of wide distribution. Herb. No. 17715.

Collected also by Younghusband near the Tagh-dum-bash Pamir in 1891. The flower-heads are of about the size of those of S. Jacquemontianus, *Dcne* but the panicle is more compact; the leaves are very different, being quite entire, lanceolate or obovate, and coriaceous.

53. SAUSSUREA SALSA, *Boiss.*

Found on dry sandy soil, not common. Herb. No. 17719.

Caucasus and N. Asia.

There is a specimen of this plant at Saharanpur, which was collected 1878 by a Russian botanist on the banks of the Aksu River.

54. SAUSSUREA SOROCEPHALA, *H. f.* and *T.*

In boggy ground at the top of the Bendersky Pass at 15,000 ft. Herb. No. 17714.

Inner W. Himalaya and Tibet to Siberia.

55. TARAXACUM OFFICINALE, *Wigg.* var.

In dampish sandy soil, 13-14,000 ft. Herb. Nos. 17726, 17727.

Temperate regions of the N. and S. Hemispheres. A very variable species. The Pamir plant is dwarf, with very narrow leaves.

56. TRAGOPOGON GRACILE, *Don.*

Only two specimens of this were found, one at over 15,000 ft. Herb. No. 17725.

Central and W. Himalaya, Kashmir, Tibet.

PLUMBAGINEÆ.

57. ACANTHOLIMON DIAPENSIOIDES, *Boiss.*

One of the commonest plants of the Great and Little Pamir, growing on dry soil in clumps resembling a sponge or brain-stone coral. It does not flower very freely. Herb. No. 17735.

Found in Afghanistan 14-15,000 ft. (Griffith) ; Chitral Expedition (Dr. Giles).

PRIMULACEÆ.

58. PRIMULA SIBIRICA, *Jacq.*

Very common in marshy ground along the banks of the R. Aksu and its affluents, 13-14,000 ft. Herb. No. 17737.

W. Tibet, Europe, North America, Arctic region.

59. PRIMULA STUARTII, *Wall.*, var. purpurea.

In boggy ground by streams of melting snow at about 15,000 ft.; not very common. Herb. No. 17736.

Alpine Himalaya, Tibet, Afghanistan.

GENTIANACEÆ.

60. GENTIANA PROSTRATA, *Hœnke.*

In damp ground amongst grass, on the open pamir, 13-14,000 ft. Herb. Nos. 17738, 17739.

61. GENTIANA DETONSA, *Rottb.*

Amongst grass in the open pamir, 13-14,000 ft. Herb. No. 17740.

Alpine Himalaya, Kashmir, Tibet to Europe, N. Asia and N. America.

62. PLEUROGYNE sp., near P. carinthiaca, *Griseb.*

Common amongst grass in damp or recently dried ground, up to 15,000 ft. Herb. No. 17742.

63. PLEUROGYNE THOMSONI, *C. B. Clarke.*

Growing in masses amongst grass in sandy rather moist soil, 13-14,000 ft. Herb. No. 17743.

Western Tibet.

64. Swertia sp., near S. marginata, *Schrenk.*

Common in moist ground up to at least 15,000 ft. Herb. No. 17741.

Collected also by Younghusband in 1891 on the Wakhijrui Pass near the Little Pamir.

BORAGINEÆ.

65. Paracaryum heliocarpum, *A. Kerner.*

In hollows and shallow ravines of the open pamir, 13-14,000 ft.; not very common, and rarely found in flower. Herb. No. 17745.

W. Himalaya, W. Tibet, Kashgár.

66. Echinospermum barbatum, *Lehm.*

Pamir region, 13-14,000 ft. Herb. No. 17746.

W. Himalaya, Tibet, Baluchistan, Afghanistan, N. Asia, and N. Africa.

67. Myosotis sylvatica, *Hoffm.*

In sheltered nalas, 14-15,000 ft., but not common. Herb. Nos. 17744, 17747.

W. Himalaya, Kashmir to N. Asia, Europe, and Canary Islands.

SCROPHULARINEÆ.

68. Scrophularia sp., near S. scabiosæfolia, *Benth.*

In stony dried-up water-courses, not common, 13-14,000 ft. Herb. No. 17748.

69. Pedicularis rhinanthoides, *Schrenk* (typical).

In marshy land along the R. Aksu, common in places; 13-14,000 ft. Herb. No. 17749.

Afghanistan, Alatau, Turkistán.

70. Pedicularis uliginosa, *Bunge.*

Marshy ground by the R. Aksu, 13-14,000 ft. Herb. No. 17751.

Sungaria, S. Altai, Transbaikalia.

71. Pedicularis cheilanthifolia, *Schrenk.*

Common in damp ground all along the banks of the R. Aksu and its affluents, up to at least 14,000 ft. Herb. No. 17752.

W. Himalaya, W. Tibet, Sungaria, Kansu.

72. Pedicularis Œderi, *Vahl.* (typical).

Marshy land along the R. Aksu, 13-14,000 ft. Herb. No. 17750.

W. Himalaya, Kashmir, Alps of Europe and Siberia, Arctic Europe, Asia, and America.

LABIATÆ.

73. Nepeta supina, *Stev.* (Fl. Brit. Ind., in part).

Occurs in masses on the slopes of the hills up to at least 14,000 ft., but is not very common. Herb. No. 17755.

W. Himalaya, W. Tibet, Caucasus.

74. Dracocephalum origanoides, *Steph.*

On bare shaly ground from 13,000 to 16,000 ft., not common, but abundant when it does occur. Herb. No. 17754.

Siberia.

75. Dracocephalum palmatum, *Steph.*

One of the common plants of the Great and Little Pamir, growing in clumps on dry ground in the open pamir. Herb. No. 17753.

Siberia.

CHENOPODIACEÆ.

76. Atriplex laciniata, *Linn.*

Pamir region, 13-14,000 ft. Herb. No. 17756.

N. America.

77. Eurotia ceratoides, *C. A. Meyer.*

One of the commonest plants of the Great and Little Pamir, growing everywhere on dry soil. It was found to be the most useful plant as fuel. Herb. No. 17728.

Inner Himalaya, Tibet, Afghanistán, Siberia, Europe, N. America.

78. Halogeton glomeratus, *C. A. Meyer.*

Found only once on a bare gravel hillock between Kizil Robát and Mihmanyol. Herb. No. 17761.

W. Tibet, Afghanistán, Caspian region, N. Asia.

POLYGONACEÆ.

79. Polygonum paronychioides, *C. A. Meyer.*

On bare shaly ground at about 16,000 ft. Herb. No. 17760.

W. Himalaya, Afghanistán, Persia.

80. Polygonum viviparum, *Linn.*

Very common in the boggy turf on the banks of streams of the Oxus system. Herb. No. 17758.

Alpine Himalaya, W. Tibet to Arctic regions.

81. Polygonum molliiæforme, *Boiss.*

Pamir region, 13-14,000 ft. Herb. No. 17759.

W. Tibet, Persia.

82. Oxyria digyna, *Hill.*

In stony ground near running water, at about 14,000 ft., but not common. Herb. No. 17757.

Alpine Himalaya, W. Tibet to Arctic regions.

GENTACEÆ.

83. Ephedra Gerardiana, *Wall.*

In a sheltered nala over 14,000 ft., not common. Herb. No. 17762.

Inner Himalaya, W. Tibet, W. and Cent. Asia, Europe.

LILIACEÆ.

84. ALLIUM BLANDUM, *Wall.*

On hill sides, at about 14,000 ft. Herb. No. 17765.
W. and Cent. Himalaya, W. Tibet.

NAIADACEÆ.

85. TRIGLOCHIN MARITIMUM, *Linn.*

Pamir region, 13-14,000 ft. Herb. No. 17763.
W. Himalaya, W. Tibet to N. Temp. regions.

86. POTAMOGETON PECTINATUS, *Linn.*

Common in marsh pools along the R. Aksu, 13-14,000 ft. Herb. No. 17764.
Temperate regions of the world.

CYPERACEÆ.

87. SCIRPUS sp.

Very common along the R. Aksu, 13-14,000 ft. Herb. No. 17767.

88. KOBRESIA SCHŒNOIDES, *Boeck.*

Pamir region, 13-14,000 ft. Herb. No. 17766.
Himalaya, W. Tibet, Caucasus, Cent. Asia, Siberia.

89. KOBRESIA ROYLEANA, *Nees.*

Pamir region, 13-14,000 ft. Herb. No. 17768.
Alpine Himalaya, W. Tibet, Afghanistán, Central Asia.

90. CAREX NIVALIS, *Boott.*

Pamir region, 13-14,000 ft. Herb. No. 17773.
Alpine Himalaya and W. Tibet, Afghanistán, Cent. Asia.

91. CAREX MELANANTHA, *C. A. Meyer.*

Fairly common along the banks of the R. Aksu and its affluents, 13-14,000 ft. Herb. Nos. 17771, 17772.

Kashmir, Afghanistán, Cent. Asia.

92. CAREX AMPULLACEA, *Good.*

In marshy ground along the R. Aksu, 13-14,000 ft., but not common. Herb. Nos. 17769, 17770.
Kashmir, Lahoul, and N. Temp. regions.

GRAMINEÆ.

93. ALOPECURUS ALPINUS, *Sm.*

Pamir region, 13-14,000 ft. Herb. No. 17774.
Northern and Arctic regions, Chili.

94. **Stipa orientalis**, *Trin.*

Pamir region, 13-14,000 ft. Herb. No. 17786.
N. Asia.

95. **Deschampsia** sp.

Pamir region, 13-14,000 ft. Herb. Nos. 17785, 17782.

96. **Deschampsia koelerioides**, *Regel.*

Pamir region, 13-14,000 ft. Herb. No. 17780.
Temperate Asia.

97. **Poa attenuata**, *Trin.* (Poa sterilis Bieb).

One of the commonest grasses of the Great and Little Pamir, growing in thick tussocks, both on the open pamir and on the slopes up to the limit of vegetation, 14-16,000 ft. Herb. No. 17777.

N. Kumaon, Kashmir, Asia Minor, Tauria.

98. **Poa pratensis**, *Linn. var.* alpigena.

Pamir region, 13-14,000, ft. Herb. Nos. 17783, 17789, 17790.
Alpine Himalaya, Kashmir to Northern and Arctic regions.

99. **Festuca ovina**, *Linn.* var. pubescens, *Hack.*

Pamir region, 13-14,000 ft. Herb. No. 17776.

100. **Festuca ovina**, *Linn.* var. valesiaca (*Hack*).

Pamir region, 13-14,000 ft. Herb. No. 17778.

101. **Bromus crinitus**, *Boiss.*

Pamir region, 13-14,000 ft. Herb. No. 17781.
W. Tibet, Afghanistán, Persia, Turkistán.

102. **Bromus erectus**, *Huds.*

Pamir region, 13-14,000 ft. Herb. No. 17775.
Europe, Asia Minor.

103. **Agropyron striatum**, *Nees.*—Triticum striatum, Stend.

Flourishes in the neighbourhood of sites of old Kirghiz encampments 13-14,000 ft. Herb. No. 17792, 17793, 17794.

104. **Hordeum violaceum**, *Boiss* and *Hohen.*

Pamir region, fairly common, 13-14,000 ft. Herb. No. 17791.
Asia Minor.

105. **Elymus dasystachys**, *Trin.*

Pamir region, 13-14,000 ft. Herb. No. 17795.
Siberia.

FILICES.

106. **Cystopteris fragilis**, *Bernh.*

Under boulders near melting snow, at about 15,000 ft., not common. Herb. No. 17796.

MUSCI.

107-111. Specimens comprising five species of mosses have been forwarded to Dr. Brotherus for determination.

CHARACEÆ.

[CHARA sp.

Sarkhin Lake, near the Baroghil Pass, Hindu Kush, at about 12,000 ft. Herb. No. 17802.]

112-115. ALGÆ. Four species were collected, one of which has been identified by Mr. George Murray of the British Museum as NOSTOC ZETHERSTEDTII, *Aresch*, previously known only from a lake in Sweden.

SECTION 5.

A Notice of the Specimens of Rocks collected on the Pamirs.

By T. H. Holland, Esq., A.R.C.S., F.G.S., Geological Survey of India.

The 13 specimens collected in the Pamirs and sent to me for examination are, on account of their similarity to rocks obtained in Kashmir and further east in the Himalayas, decidedly interesting to the Geological Survey.

Four of them resemble the common so-called *gneissose granite* of the Himalayas (Dr. Stoliczka's "central gneiss"), especially in the frequent association of biotite with muscovite as the principal ferro-magnesian constituents, and in the presence of sufficient plagioclase-felspar to lower the silica percentage to that of rocks now generally known as granitites—rocks which form a link between the granites proper and the quartz diorites.

Two are specimens of volcanic rocks representing the group of andesitic rhyolites, and thus belonging to a class which must very nearly resemble the volcanic representatives of the gneissose granite of the same area.

Although the evidence relating to the field characters of these two groups is wanting, to make any conclusions concerning their genetic connexion free of question, yet their lithological similarity is certainly suggestive.

Whilst there is little doubt, from internal evidence, that some, if not the main mass, of the so-called central gneiss of the Himalayas is a true intrusive granitic rock of igneous origin, the absence of proof of the existence of its volcanic representatives adds value to any evidence like this which bears directly on the subject.

The remainder of the specimens are, with one exception, sedimentary in origin, and are quite as interesting as the igneous rocks in the resemblances they bear to some representatives of a great system of strata occurring in different parts of the Himalayas, whose age, in the absence of fossils, remains undetermined, and in which therefore the correlation of the representatives in isolated areas is necessarily based on purely lithological resemblances and similarity of succession.

The lithological characters of the specimens under report can be completely matched by rocks found further south-east.

The specimen of crushed quartzite-conglomerate, for instance, resembles the conglomerate of the Pir Panjal system of Kashmir, described by Lyddeker. The occurrence of this rock with red quartzite, banded carbonaceous fœtid limestone, and black carbonaceous shales with sulphuretted-hydrogen springs, gives an association similar to that found in the carbonaceous system whose members occur over a large area south of the snowy range, from Kashmir to Nepal, and probably still further east.

Although there is no palæontological evidence to fix the age of these beds, yet the constant presence of a boulder bed of assumed glacial origin suggests a correlation with the boulder-bed which is associated with a fauna of carboniferous age in the Punjáb Salt Range, and with a boulder-bed occurring in the Talchir stage at the base of the Gondwána system of Peninsular India.

There are, however, certain resemblances to the Silurian portion of Mr. Griesbach's *Haimanta* series in the Central Himalayas of Hundes and Spiti, and to the limestones in Kulu, Jaunsar, and Kumaon, in which imperfect stromotoporoid structures also suggest a lower Palæozoic age; but as the points of evidence are inconclusive, it is impossible to settle at present whether these beds belong to the Lower or to the Upper section of the Palæozoic groups of stratigraphical systems.

The following is a description of the specimens:—

I. IGNEOUS ROCKS.

A.—PLUTONIC.

No. 1.—MUSCOVITE-BIOTITE-GRANITITE, FROM THE RIVER-TERRACES OF THE LITTLE PAMIR.

A large pebble, in which the quartz, felspar, and mica are easily distinguished by the naked eye. There is no appearance of foliation in the hand-specimen, but under the microscope signs of mechanical deformation appear in the form of undulose extinctions in the quartz-crystals, and in the crumpled condition of the bundles of mica. The felspars, which are largely plagioclastic, have suffered a considerable amount of kaolinization with the formation of minute, spindle-shaped, secondary crystals possessing the high double refraction of muscovite. The muscovite occurs in large quantities in nests, and the biotite has become almost completely converted into green chlorite by hydration. The presence of large quantities of free silica in the form of quartz, and of potash in the muscovite, would give a chemical composition very nearly approaching that of a normal orthoclase-granite; but the presence of so much plagioclase gives an appearance under the microscope which more strongly recalls that of typical granitites, and indicates a closer relationship with the less acid types associated with it—types that form a link with the quartz-diorites—than with the normal orthoclase-granites, which pass by reduction of silica into the syenites. Classification by silica-percentage alone might thus very easily bring together rocks which, according to the microscopic evidence, show no relationship; and might just as easily separate rocks whose mineralogical characters show a strong family likeness.

No. 2.—MUSCOVITE-BIOTITE-GRANITITE, FROM THE LOWER SLOPES OF THE HILLS BOUNDING THE LITTLE PAMIR.

There is a slightly smaller quantity of quartz than in No. 1, and the biotite is less decomposed, but the muscovite and felspars occur in about the same proportion and give a similar granitic structure.

No. 3.—BIOTITE-GRANITITE FROM THE RIVER-TERRACES OF THE LITTLE PAMIR.

In this rock muscovite is practically absent, and as the plagioclase-felspar still predominates, the rock forms a link with the quartz-diorites, by increase of soda over potash and by reduction of silica. The zoning of the plagioclase-felspars, by gradual increase of acidity, from the centre, recalls a similar feature very characteristic of the porphyritic felspars of andesites. Around these felspars, which generally show well-defined crystal-outlines, the quartz has been moulded, and in some sections even shows an ophitic disposition. The kaolinization of the more basic, and consequently more decomposable, cores of the felspar, and the conversion of biotite into chlorite along the margins of the mica-bundles, show the effect of weathering-agents on the rock.

No. 4.—BIOTITE-GRANITITE FROM THE LOWER SLOPES OF THE HILLS BOUNDING THE LITTLE PAMIR.—GEOLOGICAL PLATE I.

The principal feature noticeable in this rock is the advanced stage of change due to weathering-agents. The biotite-crystals, which retain their crystal-outlines, are almost completely changed into chlorite, with the formation of colourless epidote; and the felspars are quite brown with the products of kaolinization. Probably connected with this decomposition and secondary silicification is the presence of beautiful specimens (see *Geology of the Pamir Commission*, Plate I) of micropegmatitic intergrowths of quartz, forming the *quartz de corrosion* of French petrographers. When large quartz-crystals disfigured with bands of minute cavities are in crystallographic continuity with irregular clear extensions of the same material in the adjoining decomposed felspars, the secondary origin of the irregular outgrowths is beyond question, and there is no reason why a similar origin should not be assumed for the more characteristic micrographic structures, which are remarkable for the regularity and parallelism of crystal-outline in the isolated sections. The micropegmatitic portions are generally fine-grained in the centre, and gradually increase to broad plates further from the centre of growth. Since Professor Judd showed, in 1889, the connexion between the secondary enlargement of crystals in igneous rocks after their consolidation, and the structures known as granophyric and micropegmatitic (*Quarterly Journal of the Geological Society*, Volume XLV, page 175), a sufficient number of similar cases has been described to warrant my ascribing, without further discussion, a secondary origin to the present instance of micropegmatitic intergrowth.

B.—VOLCANIC.

No. 5.—BIOTITE-RHYOLITE, OR ANDESITIC-RHYOLITE FROM THE BLUFFS OF KIZIL ROBÁT.

The porphyritic crystals are mostly plagioclase-felspar and the blackened relics of decomposed biotite crystals. The fine-grained ground-mass sometimes shows the fluidal structure characteristic of lavas, and is considerably devitrified. The whole rock has been highly decomposed; the iron compounds, having been oxidized and hydrated, give the ground-mass of the rock a rusty-red colour; opaline silica has been deposited in cavities, and much of the original plagioclase has been replaced by calcite. The rock has evidently been exposed to springs in the neighbourhood of limestone beds and probably containing strong sulphur acids.

No. 6.—RHYOLITIC ANDESITE FROM THE NEIGHBOURHOOD OF THE HOT SULPHURETTED-HYDROGEN SPRINGS NEAR KIZIL ROBÁT.

The porphyritic crystals of plagioclase and ferro-magnesian silicates indicate a composition as basic as ordinary andesite; but the glassy ground-mass is probably much more siliceous, and a considerable quantity of secondary silica has been deposited in cavities. The fluidal and spherulitic structures of the ground-mass have survived the extreme decomposition which the more decomposable ferro-magnesian silicates have suffered. From the shapes preserved these were probably both hornblende and biotite. Calcite is the most abundant of the secondary constituents. The minute plates lining the cavities recall those of tridymite often found in volcanic rocks. This decomposition has taken place within range of limestone beds, and has probably been aided by the hot springs.

II. SEDIMENTARY ROCKS.

No. 7.—LIMESTONE-CONGLOMERATE.

With a ferruginous and calcareous cement: Kizil Robát.

No. 8.—LIMESTONE BRECCIA.

Kizil Robát.

No. 9.—BANDED LIMESTONE.

With a small quantity of magnesia and carbonaceous matter: Lower slopes of the Little Pamir.

No. 10.—Black argillaceous sandstone.

Hardened by secondary silicification like Lydian stone: Hills bounding the Pamirs.

No. 11.—Black carbonaceous shale.

Hills bounding the Pamirs.

No. 12.—Crushed quartzite-conglomerate.

Lower slopes of hills bounding the Little Pamir, near Bendersky Pass.

·No. 13.—Calcareous sinter (travertine).

Associated with hot sulphuretted-hydrogen spring near Kizil Robát.

SECTION 6.

A brief notice of some of the features of the road from Kashmir to the Pamirs.

From Bandipur the road ascends over the Tragbal Downs, a height of more than 11,000 feet, and thence descending, runs along the beautiful wooded valleys of the Kishenganga basin towards the Burzil Pass.

At the time of our upward march, in June, the open southern slopes of the hills along this part of the road were vivid, past all expressing, with colour; and to have to leave untouched all the plants that were seen demanded the inflexible resolution of the philosopher of Horace's ideal:

"Quisquis ingentes oculo irretorto spectat acervos."

The snow had not yet melted from the summit of the Tragbal, but where the ground was clear it was carpetted with Primulas and with Ranunculaceous and Iridaceous flowers, while innumerable little skink lizards basked on the rocks. These skinks (*Lygosoma himalayanum*) as well as an *Agama* (*A. tuberculata*), and the pit-viper *Ancistrodon himalayanus*, were very common all along the road, as far as the Burzil.

Amid the still unmelted snows of the Burzil we found a brilliant Alpine flora in full bloom, the most conspicuous and most numerous plants being *Primulas*, with flowers of scarlet and purple and pale-yellow, purple Larkspurs, large-leaved Saxifrage, and wild-onions with fine yellow flowers; and the patches of blood-red Primula stretching into the expanse of snow made an effect of unique beauty, even under a dull cloudy sky. In many places also the snow was pink with some microscopic organism.

Not much animal life was noticed in the neighbourhood of the Burzil: the principal forms seen were the Alpine weasel, a marmot, a mouse-hare (*Lagomys macrotis*, I am nearly sure), the Himalayan vulture, the lammergeyer, the Himalayan skink, and some beetles for the most part of, or closely allied to, European species.

From Chilam Chowki, on the far side of the Burzil, to Doyan, the road follows, crosses, and follows again the Astor river. The scenery is only less beautiful, and the flora only less brilliant, than that of Kashmir; but as one passes northwards the trees, which are now almost entirely conifers, become fewer, and the wild-flowers give place more and more to wormwood, which at last becomes the principal small plant. Along this part of the road the lizard *Agama himalayana* is extremely common, and in the river the water-ouzel.

From Doyan to Gupis the road suddenly descends in the precipitous gorge through which the Astor river flows to meet the Indus, then runs along and crosses the Indus, and then gradually ascends along the alternating rocky gorges and stony alluvial stretches of the Gilgit river. Except for occasional oases of cultivation dependent on irrigation, this part of the country is barren and desolate. Of the few wild trees seen the commonest were a tamarisk—then in flower, and growing plentifully in the beds of the rivers—and a willow; and almost the only small plants were a wormwood, and where that even failed, the common caper. Very little could be added to the zoological collections along this part of the road, except fishes, which were numerous in the river.

From Gupis to Darkot the road, after crossing the Gilgit river, ascends gradually towards the sources of the Yasin river. The river-bed was full of flowering tamarisk, and numerous oases of cultivation were passed, but though the country was by no means bare, yet vegetation on the whole was stunted and scanty, and animal life was scarce.

Near the village of Darkot the river runs through a large osier swamp, in which also were many spreading poplars, the leaves and small twigs of which were most extensively affected with galls.

Above the village of Darkot are several fine glaciers.

On the 14th July we crossed the Darkot Pass into the Yarkhun basin. The pass is a glacier bounded by bare precipitous rocks, and is devoid of life.

From the far side of the Darkot to Bozai Gumbaz, where the Little Pamir is entered, the highlands traversed are very much like the Pamir country already described, only the valleys are much narrower and deeper and the hills are much steeper. The rocks are much the same, consisting largely of hard sandstones and fissile black shales. At Sarhad is a hot sulphuretted hydrogen spring, around which however is no deposit of sinter. The vegetation is of much the same character as that of the Pamir, only it is considerably more abundant and varied: for instance, in the beds of the rivers and nullahs there are frequent thickets of a small willow and of birch and wild-rose, and on the slopes many flowering plants are common which on the Pamir are rarely seen. The animal life also is much the same, the golden marmot being very common on the heights.

SECTION 7.

A systematic account of the Zoological Collection made on the road to the Pamirs.

MAMMALS.

Order CARNIVORA.

1. PUTORIUS ALPINUS (Gebler).—The pale Weasel.

Mustela alpina, Gebbler, Mem. Soc. Imp. Nat. Mosc., VI, 1824, p. 218: Radde Reisen in Ost-Siberien I, p. 48, pl. ii: Horsfield, Cat. Mamm. Mus. H. E. I. C. S., p. 104 (? *syn.*).

Mustela temon, Hodgson, J. A. S. B., Vol. XXVI, 1857, p. 207: (?) Blanford: Mammals of 2nd Yarkand Mission, p. 32: Scully, P. Z. S., 1881, p. 203, and Ann. Mag. Nat. Hist. (5) VIII, 1881, p. 97.

Putorius alpinus, Blanford, Fauna Brit. India, Mammals, p. 168: W. Sclater, Cat. Mamm. Ind. Mus. II, 281.

An adult male from the Burzil Valley, about 11,000 feet.

The other mammals seen and recognized along the road were the pale variety of the common fox, two species of marmots, the Gilgit vole, the grey hamster, and the Tibetan hare.

BIRDS.

As in the case of the Pamir birds, Mr. F. Finn is again my collaborateur.

Order *CARINATÆ.*

Sub-order *PASSERES.*

Family CORVIDÆ.

1. PICA PICA (L).—The common Magpie.

Pica pica, Sharpe, Cat. Birds Brit. Mus., Vol. III, p. 62, and Birds of 2nd Yarkand Mission, p. 19.

The common magpie was especially numerous in September above Darkot village, at a height of over 9,000 feet. Our specimens show no unusual amount of white on the primaries.

2. NUCIFRAGA MULTIPUNCTATA, Gould.—The Large-spotted Nutcracker.

Nucifraga multipunctata, Sharpe, Cat. Birds Brit. Mus., Vol. III, p. 55, and Birds of 2nd Yarkand Mission, p. 20.

Very common in the Astor Valley in September-October. The crops of our specimens were full of pine seeds. Fine specimens were presented to the collection by Colonel Holdich and Captain McSwiney.

Family PARIDÆ.

3. PARUS (LOPHOHPANES) RUFONUCHALIS, Blyth.

Parus rufonuchalis, Gadow, Cat. Birds Brit. Mus., Vol. VIII, p. 29.
Lophophanes rufinuchalis, Sharpe, Birds of 2nd Yarkand Mission, p. 66.

Astor Valley, 8,000 feet.

Family CRATEROPODIDÆ.

4. TROCHOLOPTERUM LINEATUM, Vigors.—The Striped Babbler.

Trocholopterum lineatum, Sharpe, Cat. Birds Brit. Mus., Vol. VIII, p. 377, and Birds of 2nd Yarkand Mission, p. 100.

Astor Valley, 8,000 feet.

Family TURDIDÆ.

5. MONTICOLA CYANUS (L).—The blue Rock-thrush.

Monticola cyanus, Seebohm, Cat. Birds Brit Mus., Vol. V, p. 316.

Gilgit Valley, about 5,000 feet.

6. RUTICILLA RUFIVENTRIS (Vieillot).—The Indian Redstart.

Ruticilla rufiventris, Seebohm, Cat. Birds Brit. Mus. Vol. V, p. 342: Sharpe, Birds of 2nd Yarkand Mission, p. 87.

Darkot Valley, 10,000 feet.

7. CHIMARRHORNIS LEUCOCEPHALUS (Vigors).—The White-cap Water-redstart.

Chimarrhornis leucocephala, Sharpe, Cat. Birds Brit. Mus., Vol. VII, p. 47.
Chaemorrhornis leucocephala, Sharpe, Birds of 2nd Yarkand Mission, p. 86.

Only occasionally seen in June and July, and then only in streams near their sources (8,000 to 11,000 feet); but fairly common in October, and at much lower elevations.

8. SAXICOLA PICATA, Blyth.—The Pied Chat.

Saxicola picata, Seebohm, Cat. Birds Brit. Mus., Vol. V, p. 367: Sharpe, Birds of 2nd Yarkand Mission, p. 83.

Gilgit Valley, 5,000 to 7,100 feet.

9. ORIOLUS KUNDOO (SYKES).—The Indian Golden Oriole.

Common in the orchards of the Gilgit Valley up to 7,100 feet.

Family FRINGILLIDÆ.

10. EMBERIZA CIA, L.—The Foolish Bunting.

Emberiza cia, Sharpe, Cat. Birds Brit. Mus., Vol. XII, p. 537.
Emberiza cia and *Stracheyi*, Sharpe, Birds of 2nd Yarkand Mission, p. 47.

Darkot Valley, 10,000 feet.

Family MOTACILLIDÆ.

11. ANTHUS MACULATUS, Hodgs.—The Indian Tree-pipit.

Anthus maculatus, Sharpe, Cat. Birds Brit. Mus., Vol. X, p. 47.

Yasin Valley, 7,500 feet.

12. MOTACILLA HODGSONI, Blyth.—Hodgson's Pied Wagtail.

Motacilla hodgsoni, Sharpe, Cat. Birds Brit. Mus., Vol. X, p. 486, and Birds of 2nd Yarkand Mission, p. 57.

Astor Valley, 8,500 feet.

13. MOTACILLA CITREOLOIDES.—(Hodgs.).

Family ALAUDIDÆ.

14. GALERITA CRISTATA (L).—The Crested Lark.

Galerita cristata, Sharpe, Cat. Birds Brit. Mus., Vol. XIII, p. 625 (see also Birds of 2nd Yarkand Mission, p. 55.)

Gilgit Valley, 5,000 feet.

Sub-order *PICARIÆ.*

Family CORACIIDÆ.

15. CORACIAS GARRULA (L.)—The European Roller.

Gilgit Valley, 5,000 feet.

Sub-order *ACCIPITRES.*

Family VULTURIDÆ.

16. GYPS HIMALAYENSIS, Hume.—The Himalayan Vulture.

Gyps Himalayensis, Sharpe, Cat. Birds Brit. Mus., Vol. I, p. 8.

A magnificent male from near the Burzil Pass, about 11,000 feet. Shot and presented by Captain E. F. H. McSwiney.

Family FALCONIDÆ.

17. CERCHNEIS TINNUNCULUS (L.).—The Kestrel-hawk.

Cerchneis tinnunculus, Sharpe, Cat. Birds Brit. Mus., Vol. I, p. 425, and Birds of 2nd Yarkand Mission p. 12.

Common along the Gilgit Valley.

Sub-order *LIMICOLÆ.*

18. VANELLUS CRISTATUS, Wolf and Meyer.—The common Lapwing.

Vanellus cristatus, Seebohm, Charadriidæ, p. 210: Sharpe, Birds of 2nd Yarkand Mission, p. 138.

A single specimen—a female in immature plumage, and the only one seen—was taken at Sarhad in the Wakhán Valley, 10,500 feet.

REPTILES.

Order *SQUAMATA.*

Sub-order *LACERTILIA.*

Family AGAMIDÆ.

1. AGAMA HIMALAYANA, Stdr.

Agama himalayana, Boulenger, Cat. Lizards Brit. Mus., Vol. I, p. 362, and Fauna of Brit. Ind., Reptiles, etc., p. 149.

Stellio himalayanus, Blanford, Reptiles and Amphibia of 2nd Yarkand Mission, p. 8.

Adults were very common at the end of June and beginning of July, and young ones at the beginning of October, on the Gilgit road between the Burzil and Doyan at 11,000 to 9,000 feet.

In life, in the males at any rate, even in non-adults, the gules are dusky red.

AGAMA TUBERCULATA, Gray.

Agama tuberculata, Boulenger, Cat. Lizards Brit. Mus., Vol. I, p. 361, and Fauna of Brit. Ind., Reptiles, etc., p. 148.

Stellio tuberculatus, Blanford, Reptiles and Amphibia of 2nd Yarkand Mission, p. 25.

Common in June between Karagbal and the Burzil, 8,000 to 10,000 feet, but none were seen on the return march in October.

Family SCINCIDÆ.

3. LYGOSOMA HIMALAYANUM (Gthr.).

Lygosoma himalayanum, Boulenger, Cat. Lizards Brit. Mus., Vol. III, p. 257, pl. xvii, fig. 2, and Fauna of Brit. Ind., Reptiles, etc., p. 200.

Mocoa himalayana, Blanford, Reptiles and Amphibia of 2nd Yarkand Mission, p. 19.

This little skink was very common, at the end of June, on the Tragbal Pass at a height of about 11,000 feet, and on the ascent to the Burzil Pass at 11,000 to 12,000 feet. At these heights its habits were quite gregarious, numerous individuals living together in separate little burrows among the grass and stones. It was also frequently found along the road between the Tragbal and the Burzil. This was during the breeding season, and the ventral surface, which in spirit is leaden or greenish white, was orange or red in both sexes.

4. LYGOSOMA HIMALAYANUM, var. TRAGBULENSE.—Plate III, figs. 1, 1*a*.

Founded on two specimens.

In this variety, which was found on the descent from the Tragbal Pass, at an elevation of about 9,000 feet, the crown of the head is beautifully mottled; and the back, from the nape to the root of the tail, is traversed longitudinally by ten or eleven sharply-defined, alternate dark brown and greyish-white stripes.

There are 21 scales on the under-surface of the fourth toe.

In one specimen the 6th upper labial enters the orbit, in the other the 5th as usual.

Sub-order *OPHIDIA*.

Family VIPERIDÆ.

5. ANCISTRODON HIMALAYANUS (Gthr.).

Ancistrodon himalayanus, Boulenger, Fauna of Brit. Ind., Reptiles, etc., p. 424.

Halys himalayanus, Blanford, Reptiles and Amphibia of 2nd Yarkand Mission, p. 24.

This pit-viper was very common in June on the Gilgit road between Karagbal and the Burzil, especially at about 8,000 feet.

All our specimens have 21 rows of scales round the body.

AMPHIBIA.

Order *ECAUDATA*.

Family BUFONIDÆ.

1. BUFO VIRIDIS, Laur.

Bufo viridis, Boulenger, Cat. Batrachia Salientia Brit. Mus., p. 297, and Fauna of B . Ind., Reptiles and Batrachia, p. 504.

Bufo viridis, Blanford, Rept. and Amphibia of 2nd Yarkand Mission, p. 26; and Boulenger in Aitchison's Zool. of the Afghan Boundary Commission, Trans. Linn. Soc. Zool. (2) V, 1889, p. 105.

This toad was very common about the numerous water-courses at Gilgit, in the beginning of July; but on the return march, at the end of September, I did not see any.

It is worthy of mention that our ducks ate these toads greedily.

2. Bufo himalayanus, Gthr.

Bufo sikkimensis and *himalayanus*, Boulenger, Cat. Batrachia Salientia Brit. Mus., p. 305, pl. xx.
Bufo himalayanus, Boulenger, Fauna Brit. Ind., Reptiles and Batrachia, p. 505.

Numerous young, with the metamorphosis recently complete, found in an overflow pool of the River Yasin at about 8,500 feet, are probably referable to this species.

They agree closely with the description of *B. sikkimensis* given by Boulenger *loc. cit.*, and by Stoliczka in the Proc. A. S. B., 1872, p. 112.

FISHES.

Order *PHYSOSTOMI.*

Family CYPRINIDÆ.

1. Schizothorax nasus, Heckel.

Schizothorax nasus, Heckel, Fische aus Caschmir, p. 32, pl. vi.: Günther, Cat. Fishes Brit. Mus., Vol. VII., p. 166.

Specimens from the Yasin river at 7,500 feet agree perfectly with Heckel's figure and description. On the other hand, the fish, now in the Indian Museum collection, figured by Day (Fishes of 2nd Yarkand Mission, pl. iv., fig. 3) as *S. nasus*, Heckel, has no likeness whatever to Heckel's figure. Heckel's fish is represented with a short wide mouth-cleft and an overhanging snout, whereas the fish of Day's figure has a long mouth-cleft and a projecting mandible.

2. Schizothorax hodgsonii, Gthr.

Schizothorax hodgsonii, Günther, P. Z. S., 1861, p. 224, and Cat. Fishes Brit. Mus., Vol. VII., p. 167.

Found in the Yasin river between 7,000 and 8,000 feet. The fish that I identify with Dr. Günther's description does not correspond with the *S. progastus* of Day, with which Day has, wrongly I think, synonomized *S. hodgsonii* of Günther.

In Day's typical specimen of *S. progastus*, which is in the Indian Museum collection, the scales are comparatively large, and fall into regular cross-rows in every part of the body; the mouth is without the broad fleshy upper lip, with its remarkable sub-triangular excrescence at the snout, of *S. hodgsonii*; and the anal fin is short, falling far short of the base of the caudal when laid back.

3. Ptychobarbus conirostris, Stdr. Plate I., fig. 2 ♂, fig. 3 ♀.

Ptychobarbus conirostris, Steindachner, Verh. zool.-bot. Ges. Wien, XVI., 1866, p. 790, pl. xvii., fig. 4: Günther, Cat. Fishes Brit. Mus., Vol. VII., p. 169: Day, P. Z. S., 1876, p. 789, and Fishes of 2nd Yarkand Mission, p. 7, pl. iii., fig. 3, and Fishes of India, p. 533, pl. cxxv., fig. 3, and Fauna Brit. Ind., Fishes, Vol. I., p. 254, fig. 91.

From the Yasin river at about 8,500 feet. The fine male figured, which is $10\frac{1}{2}$ inches long, has the eye relatively smaller than that of the figures and descriptions of authors, its major diameter being but $\frac{2}{13}$ the length of the head, while in two fine females 13 inches long—one of which is figured—the eye is even smaller, its major diameter being only $\frac{2}{15}$ the length of the head.

These two females—one of which is nearly ripe, while the other appears to be just spent—are singular in having the upper lip greatly broadened and thickened, and the profile of the snout conspicuously concave.

If they did not agree with *P. conirostris* in every other particular, and if they had not been taken in the same pool with males of this species, they might have been regarded as distinct.

4. Nemachilus stoliczkæ, Stdr.

Cobitis Stoliczkæ and ***tenuicauda***, Steindachner, Verh. zool.-bot. Ges. Wien, XVI., 1866, pp. 793 and 792, pls. xiv., fig. 2, and xvii., fig. 3.

Nemachilus Stoliczkæ, Günther, Cat. Fishes Brit. Mus., Vol. VII., p. 360: Day, P. Z. S., 1876, p. 795, and Fishes of 2nd Yarkand Mission, p. 14, pl. v., fig. 2, and Fishes of India, p. 620, pl. clv., fig. 10, and Fauna Brit. Ind., Fishes, Vol. I., p. 235, fig. 84: Herzenstein, Prejevalski Reisen, Fische, p. 14 (part), pl. vii., fig. 4.

? ***Cobitis uranoscopus***, Kessler, Fedschenko's Reise in Turkestan, Pisces, p. 40., pl. vi., figs. 24, 25.

Very common in the small tributaries of the Yasin river, at about 9,000 feet.

In the young the cross-bars along the back are very distinct.

5. Nemachilus Yasinensis, n. sp.—Plate II., figs. 2, 2*a*.

D. 9 A. 6.

Distinguished by the long narrow tail and forked caudal fin.

The greatest height of the body is one-seventh to one-eighth of the total without the caudal: the least height of the tail, in a specimen over four inches long, is equal to the major diameter of the orbit.

The length of the head is a little more than two-ninths the total without the caudal.

The snout is slightly longer than the post-orbital part of the head, and is broad, rounded and depressed.

The eyes and visual axis are distinctly superior (uranoscopic), the diameter of the eye being about one-sixth the length of the head.

The dorsal fin arises immediately above the origin of the ventrals, midway between the tip of the snout and the base of the caudal: its height is half again that of the body below it, or more.

The anal when laid back reaches but little over halfway to the base of the caudal.

The caudal is conspicuously forked.

The pectorals are as long as the head, and reach considerably beyond halfway to the ventrals, which latter reach a little beyond the origin of the anal.

No scales. The lateral line is remarkably prominent and conspicuous in the anterior fourth of the body, and remarkably inconspicuous, or obsolete, in the posterior two-fourths.

Colours: back yellowish green with numerous indefinite blackish-green cross-bars: head, and sides of body, yellowish with much fine dark-green mottling: under-surface, yellow. Fins yellowish, the caudal and first one or two rays of the dorsal speckled.

From the Yasin river at about 8,500 feet.

MOLLUSCA.

Order *GASTROPODA PULMONATA*.

Family LIMNÆIDÆ.

1. Limnæa lagotis, Schröter, var. costulata, von Martens.

Limnæa lagotis* var. *costulata, von Martens, Fedschenko Reise, Mollusca, p. 26, pl. ii, fig. 24.

Our specimens exactly resemble von Marten's figure. Abundant in stagnant overflow pools of the Yasin river at Handur, at an elevation of about 8,500 feet.

INSECTS.

Order *HYMENOPTERA.*

Family APIDÆ.

1. Anthophora sp.

A species from Bunji in the Indus Valley, closely resembling specimens in the Indian Museum collection, of *Anthophora senex* from Yarkand (Smith, Hymenoptera of 2nd Yarkand Mission, p. 7), and of *Anthophora atroalba*, from Hari-rud and Badghis (W. F. Kirby in Aitchison's Zool. of Afghan Boundary Commission, Trans. Linn. Soc., Zool. (2), V., 1889, p. 137).

In the undetermined collection of bees in the Indian Museum collection are specimens of the Bunji species from Bushire and Baluchistan.

2. Bombus sp. 1 and 2.

Two species of bumble-bee were taken in June, one near the top of the Tragbal Pass (at about 10,000 feet), the other on the ascent to the Burzil Pass (at about 11,000 feet).

They do not agree with any of the species collected by the 2nd Yarkand Mission, or with anything in the Indian Museum.

Family VESPIDÆ.

4. Vespa orientalis, Fabr.

Vespa orientalis, Amedée Lepeletier de Saint Fargeau, Hist. Nat. Insectes, Vol. I, p. 507: de Saussure, Monogr. Guêpes Sociales, p. 132: W. F. Kirby in Aitchison's Zoology of the Afghan Boundary Commission, *tom. cit.*, p. 135.

Very common at Bunji on ripening galls.

5. Vespa germanica, Fabr.

Vespa germanica, Saint Fargeau, Hist. Nat. Ins., Vol. I., p. 515: de Saussure, Monogr. Guêpes Sociales, p. 116, pl. xiv, figs. 4, 4*a*—*c*: F. Smith, Hymenoptera of 2nd Yarkand Mission, p. 17.

Very common at Bunji on ripening galls.

6. Polistes sp.

A species of *Polistes* bearing a very close resemblance to *P. gallica*, Fabr. (St. Fargeau, Hist. Nat. Ins., Vol. I, p. 527, pl. ix, figs. 4, 5, 6, and de Saussure, Monogr. des Guêpes Sociales, p. 48), was common at Bunji on ripening galls.

It appears to differ from *P. gallica* only (1) in being rusty brown where that species is black, and (2) in having the pronotum traversed fore and aft, in the middle, by two nearly parallel bright yellow lines.

Order *COLEOPTERA.*

Family DYTISCIDÆ.

1. Dytiscus (Hydroporus) griseostriatus, de Geer.

This small water-beetle, which I identify from specimens in the Indian Museum collected by the 2nd Yarkand Mission (Coleoptera of 2nd Yarkand Mission, p. 37), was common in July in Lake Sarkhin, near the Baroghil Pass, about 14,000 feet.

Family SILPHIDÆ.

2. Silpha opaca, L.

Fairly common in June on the Gilgit Road as far as the Burzil Pass, and up to 11,000 feet.

It corresponds completely with a specimen from the Jhelum Valley determined, for the Indian Museum, by M. Grouvelle.

Family SCARABÆIDÆ.

3. SCARABÆUS SYLVATICUS, Panz.

Scarabæus sylvaticus, Panzer, Index Entomologicus, Vol. I, p. 2, and Fauna Coleopt. German. XLIX, tab. 8 Sharpe in Coleoptera of 2nd Yarkand Mission, p. 46.

Found on the ascent to the Burzil Pass about 11,000 feet.

Identical with, but a little larger than, the Yarkand specimens so named by Sharpe: identical with Panzer's coloured figure.

Family MALACODERMIDÆ.

4. LAMPROPHORUS sp.

A single specimen almost exactly resembling specimens in the Indian Museum collection that have been identified by the Rev. H. S. Gorham as *L. nepalensis*, Gray.

Found on the Gilgit road, in June, at an elevation of 8,700 feet. Strongly luminous.

Family TENEBRIONIDÆ.

5. PROSODES TRISULCATA, Fk. Bates.

Prosodes trisulcata, Fk. Bates in Coleoptera of the 2nd Yarkand Mission, p. 68, pl. ii fig. 11.

Ascent to Burzil Pass, about 11,000 feet.

Family CANTHARIDÆ

6. MELOE PROSCARABÆUS, L.

Meloe proscarabæus, L., Olivier, Hist. Nat. Insectes Coleoptères, Vol. III., pp. 5, 6, and Vol. VII., pl. No. 45 I., figs. 1, *a*, *b*, *c*, *d*, *e*.

A male and female, from the ascent to the Burzil Pass, 11,000 feet, agree in every particular with Olivier's description and copious figures.

7. MYLABRIS MACILENTA, Marseul.

Mylabris macilenta, Fk. Bates in Coleoptera of 2nd Yarkand Mission, p. 78.

Very common in June along the Gilgit road between 8,000 and 9,000 feet, on the flowers of a sort of hemlock.

8. MYLABRIS sp. 2.

In the Wakhan Valley, at 13,000 feet.

Family CURCULIONIDÆ.

9. CATAPIONUS BASILICUS, Bohem.

Catapionus basilicus, Lacordaire, Hist. Nat. Insectes Coleoptères, Vol. VI., p. 42, pl. 62, fig. 1.

Ascent to Burzil Pass, 11,000 feet.

Order *LEPIDOPTERA*.

Sub-order *RHOPALOCERA*. Butterflies.

Mr. de Nicéville has again been the directing collaborateur in this report upon the butterflies. In fact, had it not been that I was officially responsible for the preparation of the report, I should have preferred to leave these insects entirely to him.

Family NYMPHALIDÆ.

1. Lasiommata menava, Moore.

Lasiommata menava, Moore, P. Z. S. 1865, p. 499, pl. xxx., fig. 8, ♂, and Lepidoptera Indica, Vol. II., p. 9, pl. 96, figs. 4, 4*a*, ♂, ♀.

Lasiommata mæroides, Felder, "Novara" Lepidoptera, Vol. III., p. 496, No. 859, pl. lxix., fig. 1, ♀.

Pararge nashreddini, Christoph, Horæ Soc. Entomol. Ross, Vol. XII, 1876, p. 240, No. 9, pl. v., figs. 13, 14, ♂, ♀.

Pararge menava, Groum-Grshimaïlo, Faun. Lép. Pamir, in Mém. Lép. IV, 1890, p. 489, No. 167.

On the Gilgit road, between Dashkin and Doyan, 8,000 to 9,000 feet.

2. Eumenis baldiva, Moore.

Lasiommata baldiva, Moore, P. Z. S., 1865, p. 499, No. 84, pl. xxx., fig. 4, ♂.

Hipparchia baldiva, Marshall and de Nicéville, Butterflies of India, Vol. I., p. 188, No. 180.

Eumenis baldiva, Moore, Lepidoptera Indica, Vol. II., p. 18, pl. 98, figs. 1, 1a, ♂, ♀ (*ubi synon.*).

Hipparchia lehana, Moore, Ann. Mag. Nat. Hist. (5) I. 1878, p. 227, and Lepidoptera of 2nd Yarkand Mission, p. 1, pl. i, fig. 4, ♂; Marshall and de Nicéville, Butterflies of India, Vol. I., p. 188, No. 181, pl. xvi., fig. 48, ♀.

Eumenis lehana, Moore, Lepidoptera Indica, Vol. II., p. 19, pl. 98, figs. 2, 2a, ♂, ♀.

Two perfect specimens were taken in July on the heights of the Wakhan Valley, between 12,000 and 13,000 feet.

In one the inner edge of the tawny band on the forewing runs obliquely inwards posteriorly, and the small ocellus at the anal angle of the hindwing is present: in the other there is no special inclination inwards posteriorly of the tawny band, and the ocellus is absent. For these among other reasons we consider ourselves justified in uniting Moore's two species.

3. Eumenis thelephassa (Hübner).

Hipparchia thelephassa, Marshall and de Nicéville, Butterflies of India, Vol. I., p. 187, No. 179.

Eumenis thelephassa, Moore, Lepidoptera Indica, Vol. II., p. 20 (*ubi synon.*).

Very numerous in July on the Gilgit road, between Dashkin and Doyan, 8,000 to 9,000 feet.

4. Aulocera swaha, Kollar.

Aulocera swaha, Kollar in Hügel's Kaschmir, Vol. IV., pt. ii., p. 444, No. 1, pl xiv., figs. 1, 2, 1844: Moore, Lepidoptera of 2nd Yarkand Mission, p. 2, No. 4, and Lepidoptera Indica, Vol. II., p. 33, pl. 100, figs. 2, 2*a*, ♂, ♀ (*ubi synon.*): Marshall and de Nicéville, Butterflies of India, Vol. I., p. 197, No. 188.

Gilgit road, between Dashkin and Doyan, 8,000 to 9,000 feet.

5. Karanasa huebneri (Felder).

Heights of the Wakhan Valley, 12,000 to 14,000 feet.

These specimens are much darker and much larger than those from the Great Pamir.

6. Kanetisa pimpla (Felder).

Satyrus pimpla, Felder, "Novara" Lepidoptera, Vol. III., p. 494, No. 856, pl. lxix., figs. 10, 11, ♀, 1867.

Hipparchia pimpla, Marshall and de Nicéville, Butterflies of India, Vol. I., p. 185, No. 177, ♂, ♀.

Kanetisa pimpla, Moore, Lepidoptera Indica, Vol. II., p. 43, pl. 102, figs. 3, 3*a*, ♂, ♀ (*ubi synon.*).

Gilgit road, between Dashkin and Doyan, 8,000 to 9,000 feet.

7. Maniola cheena, Moore.

Epinephele cheena, Moore, P. Z. S., 1865, p. 501, No. 93, pl. xxx., fig. 6, ♂, ♀: Marshall and de Nicéville Butterflies of India, Vol. I., p. 205, No. 194.

Maniola cheena, Moore, Lepidoptera Indica, Vol. II, p. 50, pl. 104, figs. 1, 1 , ♂, ♀ (*ubi synon.*).

Gilgit road, between Dashkin and Doyan, 8,000 to 9,000 feet.

8. CHORTOBIUS HILARIS (Staudinger).

Northern side of Darkot Pass, 12,000 feet.

9. PARALASIA JORDANA (Staudinger).

Erebia jordana, Staudinger, Berlin. Entomol. Zeitschr. XXVI, 1882, p. 171 : Groum-Grshimaïlo, Pamir et sa Faune Lépidoptérologique, Mem. Lép IV, 1890, p. 449, No. 141, pl. xiii, figs. *4b*, *4c*.

Paralasia jordana, Moore, Lepidoptera Indica, Vol, II., p. 106.

A single specimen was taken at about 14,000 feet near the Baroghil Pass.

10. ARGYNNIS VITATHA, Moore.

Northern side of Darkot Pass, about 12,000 feet, and also near the Baroghil Pass, at about 14,000 feet.

11. MELITÆA TRIVIA, Wien. Verz.

Melitæa trivia, Wien. Verz. (Schiff.), p. 179, No. 8, 1776 : Lang, Rhopalocera Europæ, p. 187, No. 9, pl. 44, fig. 5.

Common in July on certain barren slopes of the Wakhan Valley at about 12,000 feet.

12. MELITÆA BALBITA, Moore.

Melitæa balbita, Moore, P. Z. S. 1874, p. 268, No. 26, pl. xliii., fig. 5 : de Nicéville, Butterflies of India, Vol. II., p. 26, No. 311, pl. xviii, fig. 71, ♂, ♀.

Wakhan Valley, about 12,000 feet, and also on the ascent to the Tragbal Pass, about 9,000 feet.

Family LYCÆNIDÆ.

13. LYCÆNA OMPHISSA (Moore).

Polyommatus omphissa, Moore, P. Z. S. 1874, p. 573, pl. lxvi, fig. 2, ♂.

Lycæna omphissa, de Nicéville, Butterflies of India, Vol. III., p. 84, No. 667.

Between Dashkin and Doyan, 8,000 to 9,000 feet.

14. LYCÆNA ARIANA (Moore).

Polyommatus ariana, Moore, P. Z. S. 1865, p. 504, No. 103, pl. xxxi, fig. 2, ♂, and Lepidoptera of 2nd Yarkand Mission, p. 6, No. 22.

Lycæna ariana, de Nicéville, Butterflies of India, Vol. III., p. 72, No. 649 (*ubi synon.*).

Northern side of Darkot Pass, about 12,000 feet.

15. CHRYSOPHANUS KASYAPA.

Chrysophanus kasyapa, Moore, P. Z. S. 1865, p. 506, No. 111, pl. xxxi, fig. 10, ♂ : de Nicéville, Butterflies of India, Vol. III., p. 319, No. 88 (*ubi synon.*).

Ascent to Tragbal Pass, 8,000 to 9,000 feet.

16. THECLA SASSANIDES, Kollar.

Thecla sassanides, Kollar, Denk. Ak. Wien, Vol. I, 1850, p. 51 : de Nicéville, Butterflies of India, Vol. III., p. 298, No. 862, pl. xxvii., fig. 202, ♂ (*ubi synon.*) : Groum-Grshimaïlo, Faun. Lépidopt. Pamir, p. 354, No. 48.

Near Dashkin, Gilgit road, about 8,000 feet.

Family PAPILIONIDÆ.

17. SYNCHLOE CALLIDICE (Esper).

Papilio callidice, Esper, Schmett, I. 2, pl. cxv., figs. 2, 3.

Pieris kalora, Moore, P. Z. S. 1865, p. 489, pl. xxxi., fig. 15, ♂.

Pieris callidice, var. *kalora* Groum-Grshimaïlo, Faun. Lép. Pamir, p. 226, No. 27.

Northern side of Darkot Pass, about 12,000 feet.

18. Colias hyale (L.).

Papilio hyale, Linn. Syst. Nat., ed. 10, I. 2. 469, No. 71, 1758.
Colias hyale, Moore, Lepidoptera of 2nd Yarkand Mission, No. 14, p. 4: Leech, Butterflies from China, Japan, and Corea, pt. II., p. 431, pl. xxxiv, figs. 1—14.
Colias neriene, Fisch. *apud* Gray, Lep. Ins. Nepál, p. 9, pl. v, fig. 3.

Singal, Gilgit river valley, 7,100 feet.

19. Colias fieldii, Ménétriès.

Colias fieldii, Ménétriès, Cat. Lep. Mus. Petrop. pt. II., p. 79, No. 252, pl. i., fig. 5, ♂, 1855. Moore, Lepidoptera of 2nd Yarkand Mission, p. 4, No. 15: Leech, Butterflies from China, Japan and Corea, pt. II., p. 438, pl. xxxv., figs. 6, 7, ♂, ♀.
Colias edusa, Gray (*nec* Linn.), Lep. Ins. Nepál, p. 9, pl. v., fig. 2, ♀.

Chorwán, Gilgit road, 8,100 feet, and also at Singal, Gilgit river valley, 7,100 feet.

20. Mancipium brassicæ (L.).

Papilio brassicæ, Linn., Syst. Nat., ed. 10, I. 2. 467, No. 58, 1758.
Pieris nepalensis, Gray, Lep. Ins. Nepál, p. 9, pl. vi., fig. 3, ♂, fig. 1, ♀.
Synchloe brassicæ, Moore, Lepidoptera of 2nd Yarkand Mission, p. 4, No. 10 (*ubi synon.*).
Pieris brassicæ var. *nepalensis*, Groum-Grshimaïlo, Faun. Lep. Pamir, in Mem. Lep. IV, 1890, p. 214, No. 15.

Singal, Gilgit river valley, 7,100 feet.

21. Gonepteryx rhamni (L.).

Papilio rhamni, Linn. Syst. Nat., ed. 10, I. 2. 470, No. 73, 1758.
Rhodocera rhamni, var., Gray. Lep. Ins. Nepál, p. 9, pl. v., fig. 1, ♂.
Gonepteryx nepalensis, Doubleday, Gen. Diurn. Lep., Vol. I., p. 71, No. 9.

Gilgit road, 8,100 feet.

22. Parnassius epaphus, Oberthür.

Common on the northern side of the Darkot Pass, at about 12,000 feet.

23. Parnassius charltonius, Gray.

Parnassius charltonius, Gray, Cat. Lep. Ins. Brit. Mus., Vol. I., p. 77, No. 355, pl. xii., fig. 7, ♂, 1852: Moore, Lepidoptera of 2nd Yarkand Mission, p. 5, No. 17, pl. i., fig. 3, ♀: Groum-Grshimaïlo, Faun. Lep. Pamir, in Mem. Lep. IV, 1890, p. 189, No. 10, pl. ii., figs. 1 *a*, *b*, *c*, ♂, ♀.

Northern side of Darkot Pass, about 12,000 feet.

24. Papilio ladakensis, Moore.

Papilio ladakensis, Moore, Journ. Asiat. Soc. Bengal, Vol. LIII., pt. 2, 1884, p. 46.
Papilio machaon sphyrus ladakensis, Rothschild, Novitates Zoologicæ II, 1895, p. 275.

Ascent to Burzil Pass, 11,000 feet, and also near the Baroghil Pass, about 14,000 feet.

LEPIDOPTERA HETEROCERA. Moths.

Family SPHINGIDÆ.

25. Macroglossa Stellatarum, L.

Macroglossa stellatarum, Hampson, Faun. Brit. Ind., Moths, Vol. I., p. 118.

Astor valley, about 7,000 feet.

26. Macroglossa sp. 2.

From the ascent to the Barzil Pass, about 10,800 feet, a species nearer to *M. vialis* Butler, than to any other Indian species.

Order *DIPTERA.*

The only dipterous insect in the collection is a large and rapacious species of Asilid fly, which was very common in June, along the Gilgit road, at about 8,000 feet. One of these was caught flying with a moth several times its own size in its forelegs.

Order *HEMIPTERA.*

Family PENTATOMIDÆ.

1. EURYDEMA sp.

A species closely allied to *E. pulchrum*, Westwood, and still more closely to *E. ornatum*, Linn. (*vide* Wolff, Icones Cimicium, I., p. 15, pl. ii., fig. 15) and to *E. herbaceum*, Herrich-Schäffer (*vide* Panzer, Faun. Ins. German., 115, 12, and Hahn, Wanzenartig. Insekt. III, 13, pl. lxxvii., fig. 239), with the last of which (which from a comparison of Hahn's and Panzer's figures appears to be a somewhat variable species) it is perhaps identical.

From the ascent to the Burzil Pass, about 11,000 feet.

Family REDUVIIDÆ.

2. REDUVIUS (HARPISCUS) REUTERI, Distant.

Reduvius (Harpiscus) reuteri, Distant, Trans. Entomol. Soc. Lond., 1879, p. 125, and Rhynchota of 2nd Yarkand Mission, p. 11, fig. 9.

From the ascent to the Burzil Pass, about 11,000 feet. Compared with Yarkand specimens in the Indian Museum.

Family APHIDÆ.

At Bunji the aspens were profusely affected by a gall-insect, the resulting galls being objects of great interest to the three species of wasps above mentioned.

Near the village of Darkot also the poplar trees were most remarkably infested by gall-insects.

Specimens of the galls and their contents were sent to Mr. G. B. Buckton, F.R.S., who has been kind enough to furnish the following account of them :—

"Unfortunately the galls have been cut and their constructors have, therefore, with the exception of 5 or 6 individuals, escaped. Out of such slender materials I cannot do more than hesitatingly express an opinion that the galls are the work of two new species of *Pemphigus*. I will make a short diagnosis of each."

7. "PEMPHIGUS NAPÆUS, n. s. (?), G. B. Buckton.

Winged female : Head and thorax black. Abdomen green. Antennæ six-jointed : third joint the largest and much annulated : 4th, 5th, and 6th nearly equal : the sixth ends with a 'nail.' Eyes large. Rostrum about equal to the width of the thorax. Nectaries none. Legs black : tarsi rather long : claws 2. Wings as in *Pemphigus :* stigma and veins brown.

Pupa : all green and of a long oval form.

Larva : forms galls on the poplar trees growing in the Yasin River Valley, at an elevation of 9,000 feet, near Darkot.

The *galls* measure about 0·90 inch, have a smooth and shiny exterior, and bright green colour mottled with yellow. They consist of one chamber, and their interior is smooth. They are unlike the galls of the European *Pemphigus bursarius*, but the insects are closely allied."

8. "PEMPHIGUS IMMUNIS, n. s. (?), G. B. Buckton.

Winged female : Head and thorax shiny piceous brown. Head and eyes small. Antennæ short, composed of six joints : the 3rd the longest, not annulated, and not longer than the 4th and 5th together. Abdomen green and mottled with yellow. Wings as in *Pemphigus bursarius.* Body 0·11 × 0·04 inch.

Pupa : ovate, without nectaries, and green : 0·08 inch.

Larva: constructs hard woody rugose galls on the twigs of the aspen trees at Bunji on the Gilgit Road, at an elevation of 4,000 feet. Size of galls 0·80 inch. Externally the galls are in colour and texture like a walnut shell. The natural exit of the flies is at the summit of the gall. Afterwards the gall appears to split open. The interior has deep furrows, and it has only one chamber."

Order *ORTHOPTERA.*

Family ACRIDIIDÆ.

1. Pachytylus cinerascens, Fabr.

Pachytylus cinerascens, DeSaussure, Prodr. Oedipodiorum Ins. ex ord. Orthopterorum, p. 120, and Additamenta ad. Prodromum, pp. 43, 167.

Common in the cornfields of Sarhad in the Wakhan Valley, 10,500 feet.

I have compared ours with Indian specimens determined by M. DeSaussure.

2. Sphingonotus indus, Sauss.

Sphingonotus indus, DeSaussure, Prod. Oedipod. ex ord. Orthopt., p. 204, and Additamenta, p. 78.

Common in the fields about Sarhad in the Wakhan Valley, about 10,500 feet.

3. Sphingonotus nebulosus, Fisch. ?

? *Sphingonotus nebulosus*, DeSaussure, Prod. Oedipod. ex ord. Orthopt., p. 205, and Additamenta, pp. 78, 87.

Having nothing for comparison, I have some hesitation in identifying this species, which is very common near Gilgit. But although it was so common, it was so alert, and such a powerful flyer, that I could only manage to get one specimen.

It differs most conspicuously from *S. indus* in being larger; in having the head, thorax and abdomen very much lighter in colour; in having the elytra beyond the second cross-band much more, and more definitely, spotted; in having the black (in life prussian-blue) band on the hind-wings more than twice as broad; and in having the hind-angle of the wings more marked.

It agrees with DeSaussure's description of *S. nebulosus* in all particulars except in having the inner side of the femora of the hind legs dark blue, instead of black.

I am much indebted to Mr. E. Barlow, Assistant in the Entomological Department of the Indian Museum, for assistance in comparing my specimens with those in the Museum collection.

ANNELIDA CHÆTOPODA.

Three species of earthworms were obtained, one in the Kishenganga Valley at 8,100 feet, one in the Gilgit River Valley at over 7,000 feet, and one in the Yasin Valley at 8,000 feet. Specimens of all of these were sent to Mr. F. E. Beddard, F.R.S., who writes as follows concerning them :—

> "They are entirely European, *i. e.*, Palæarctic species: they belong, in fact, to the usual British forms. This is of interest, as being an approximation to discovering the limits of the Oriental region for worms."

Government of India Central Printing Office.—No. 9 F. D.—12-5-98.—145.—[H. R.]

EXPLANATION OF THE PLATES.

√PLATE.

Head and skin of Ovis poli.

√GEOLOGY PLATE I.

"Quartz de Corrosion" in Biotite Granitite, × 25.

√ZOOLOGY PLATE I.

Fig. 1. Schizopygopsis severzovi, Herz.

Fig. 2. Ptychobarbus conirostris, Stdr., ♂.

Fig. 3. Ptychobarbis conirostris, Stdr., ♀.

√ZOOLOGY PLATE II.

Fig. 1, 1*a*. Lygosoma himalayanum (Gthr) var. tragbulense.

Fig. 2, 2*a*. Nemachilus yasinensis, Alc.

√ZOOLOGY PLATE III.

Fig. 1. Branchipus bobrinskii, Alc. ♂, × 10.

Fig. 1*a*. Head of Branchipus bobrinskii, Alc. ♂, × 12.

Fig. 2. Daphnia bogoiavlenskii, ♀, × 18.

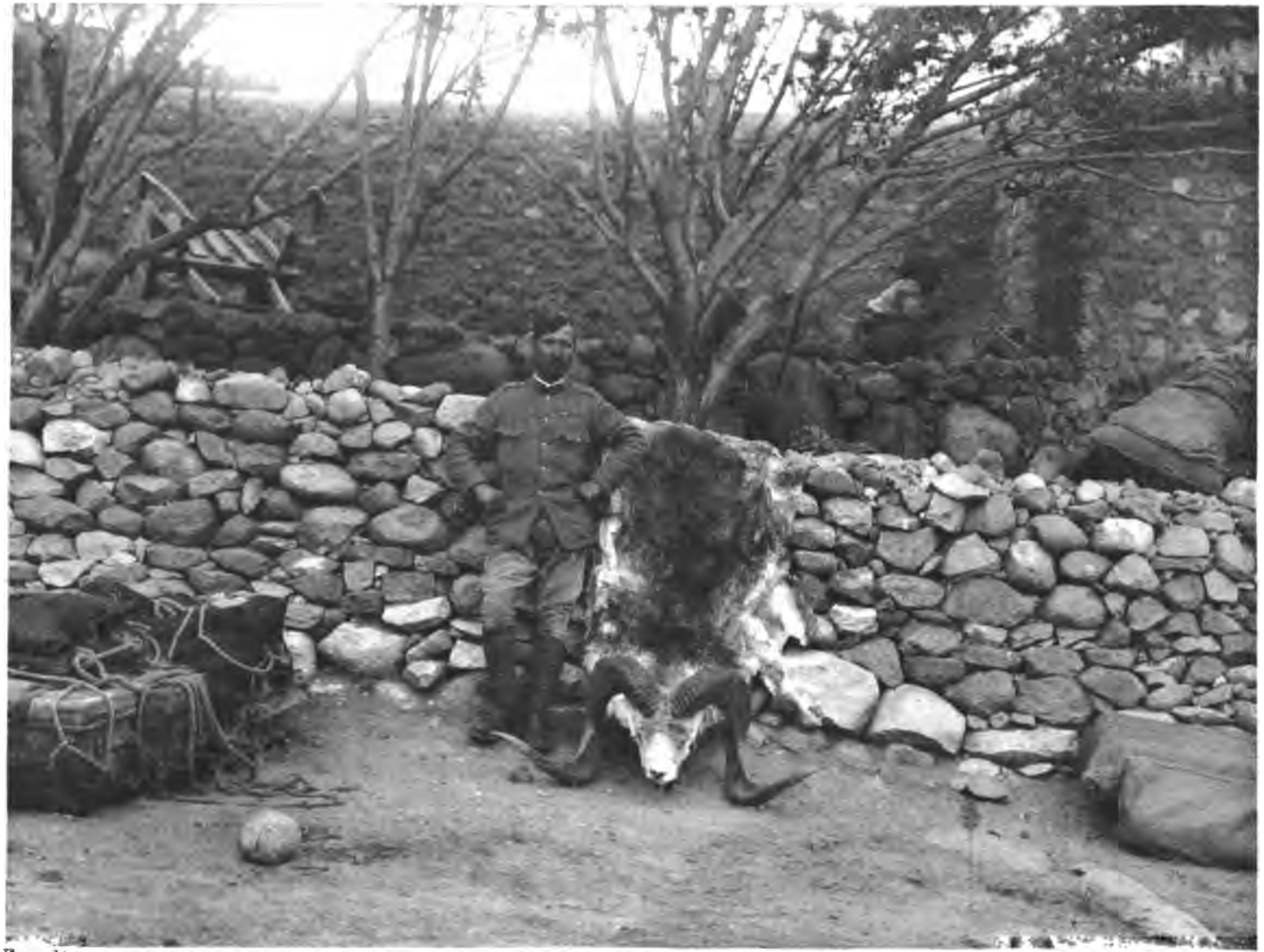
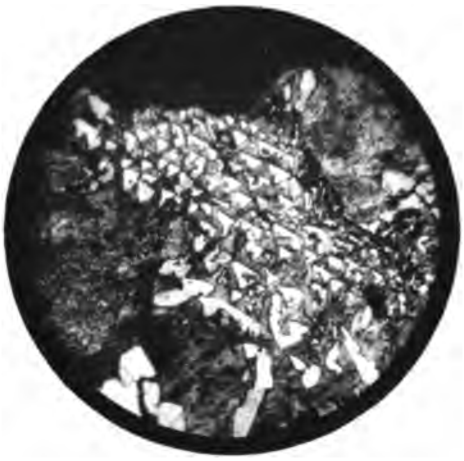


Photo-etching.

Survey of India Offices, Calcutta, October, 1896.

HEAD AND SKIN OF OVIS POLI.

PLATE 1.

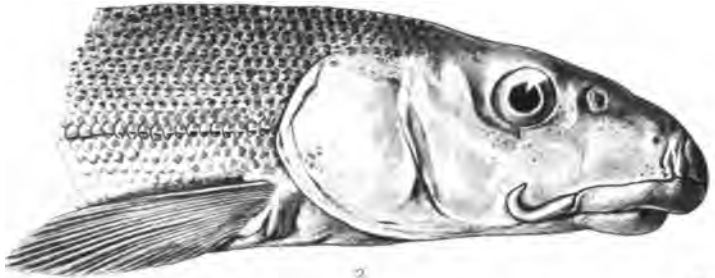


"QUARTZ DE CORROSION" IN BIOTITE GRANITITE, FROM THE LITTLE PAMIR, × 25, NICOLS +.

T. H. Holland, Photo.

Photo-etching - Survey of India Offices, Calcutta, July 1896.

PLATE I.



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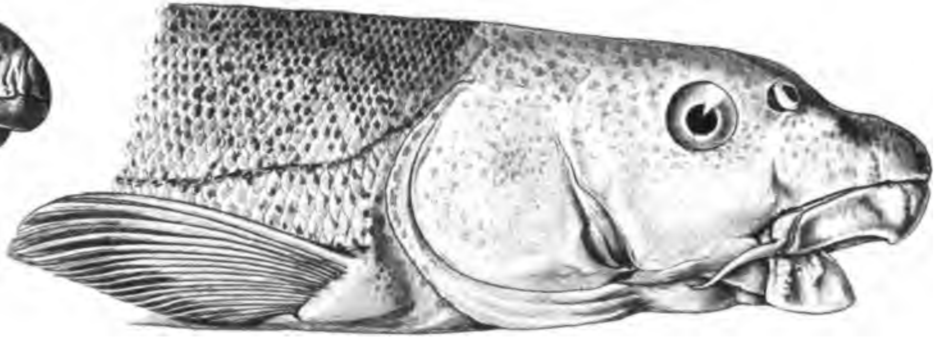

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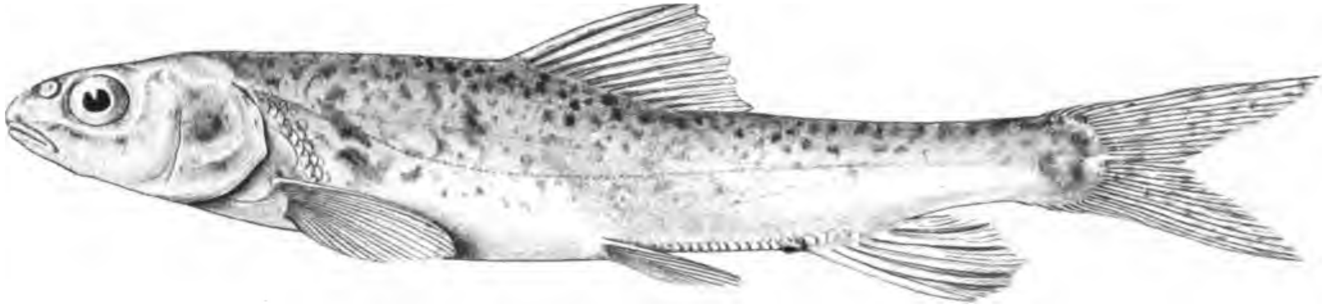


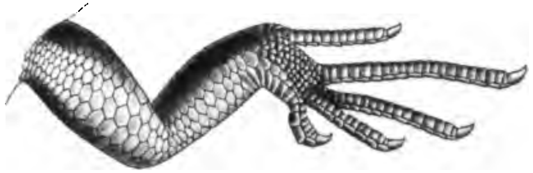
1.

1. SCHIZOPYGOPSIS SEVERZOVI. HERZ. 2. 3. PTYCHOBARBUS CONIROSTRIS. STDR. ♂. ♀.

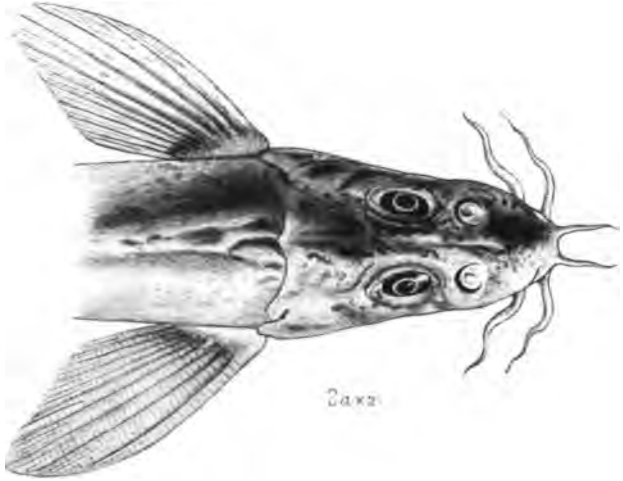
Photo-etching

Survey of India Offices, Calcutta, July 1896.

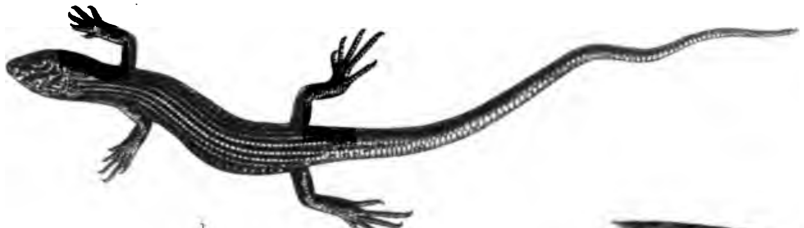
PLATE II.



1a × 4.



2a × 2.



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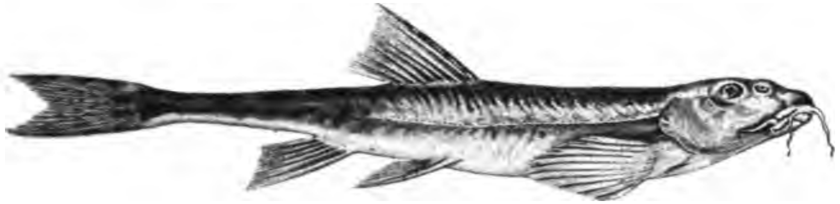


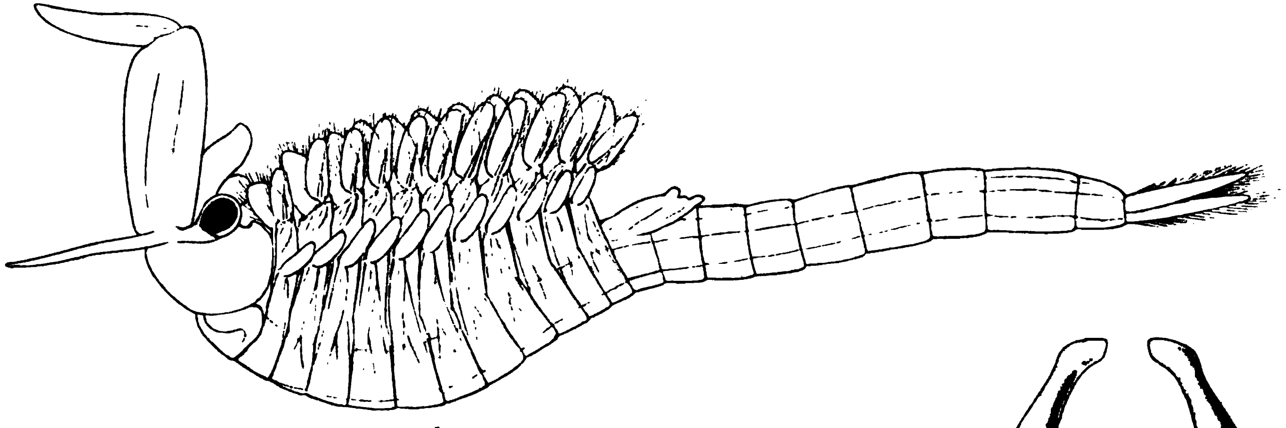
2.

1. 1*a*. LYGOSOMA HIMALAYANUM, (GTHR.) VAR: TRAGBULENSE. 2. 2*a*. NEMACHILUS YASINENSIS.

Photo etching.

Survey of India Offices, Calcutta, July 1896.

PLATE III.



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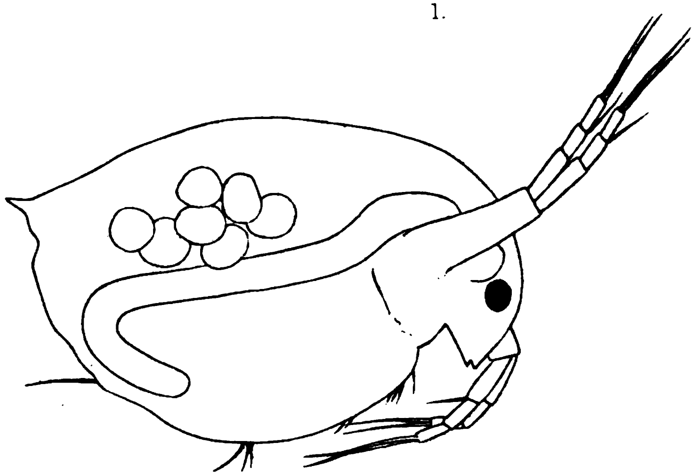

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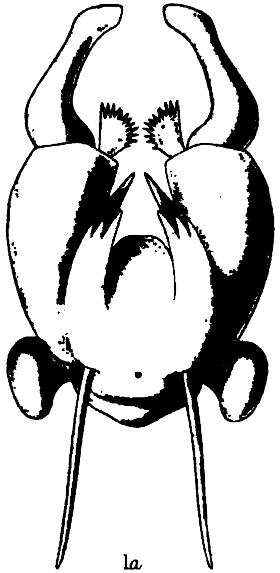

1a

1. BRANCHIPUS BOBRINSKII, × 10, ♂.

2. DAPHNIA BOGOIAVLONSKII, × 18, ♀.

1a. HEAD OF BRANCHIPUS BOBRINSKII, × 12 ♂.

Photo-etching.

Survey of India Offices, Calcutta, July 1896.